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MAY 1961 VOLUME 3 NUMBER 5

ARCHITECTURAL & ENGINEERING NEWS
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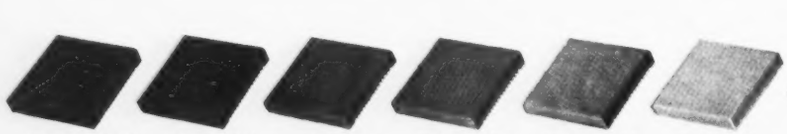

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BPA

NEWS

Cover design by Tony Palladino. Editorial emphasis this month is on lighting and acoustics. Flexible acoustical and lighting design for the flexible auditorium is discussed in two articles appearing on pages 11 and 20. Lighting with electroluminescence is described on page 24.

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GAZETTE

Graduates of the New York University School of Architecture and Allied Arts have re-established an alumni association. The group adopted a formal set of by-laws and reorganized the School of Architecture Alumni Association of New York University. Elected as officers were: John Stanley Sharp, AIA, partner in the firm of Ketchum and Sharp, president; Stanley H. Klein, AIA, of Stanley H. Klein, Architects, vice-president; Arthur W. H. Towne, architectural consultant, treasurer; Joseph John Roberto, AIA, University Architect of the New York University, recording secretary; and Miss Carolyn Schor, interior designer, corresponding secretary. According to Mr. Roberto, the Association still lacks the present addresses of many of the School's graduates. Letters should be addressed to: Mr. Joseph John Roberto, AIA, University Architect, New York University, 40 Washington Square South, New York City 3, N. Y.

Thomas De Gaetoni, Director of the Stage Department of the Juilliard School of Music, New York City, has been formally elected president of the United States Institute of Theatre Technology. Mr. Ben Schlanger, architect, member of the Board of Standards and Planning of the New York Chapter of ANTA, and consulting architect on Lincoln Center for the Performing Arts, was elected vice-president. Dr. Joel E. Rubin, director of theatrical lighting division of Kliegl Brothers Lighting Co., and consultant in theatre planning and architecture, was elected technical secretary; and John Cornell, chairman of Stage Managers Committee of Actor's Equity, was elected secretary-treasurer.

Norman P. Mason, formerly administrator of the Government's Housing & Home Finance Agency, was recently appointed chairman of the American International Housing Corporation. Mr. Mason was an executive of the William F. Proctor Co., before entering government service in 1954. Mr. Mason has also served as head of the Federal Housing Administration, as a member on the President's Advisory Commission on Housing and was at one time president of the National Retail Lumber Dealers Assn.

Welton D. Becket, FAIA, architect, was recently named "Man of the Year" at the construction industries annual Gridiron Banquet at the Hollywood Palladium in Los Angeles. Mr. Becket heads his own firm in Los Angeles.

John P. Draney, civil engineer, has been appointed sales engineer at the Chicago office of the Master Builders Co. Draney is a graduate of Cornell University with a B. S. in Civil Engineering. He is a member of the American Society of Civil Engineers and Cornell Engineers Club.

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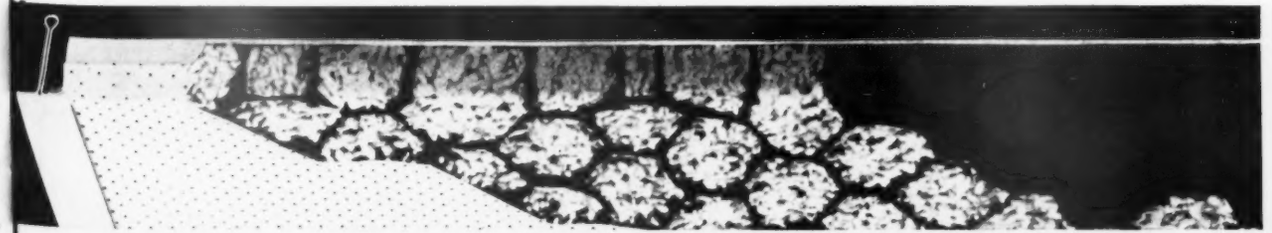

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GAZETTE

John Lane Evans, AIA, has been named City Architect in the Philadelphia Department of Public Property. Evans, 59, scored highest in civil service testing among three applicants seeking the position. As City Architect, he will supervise design of all city installations. A graduate of the University of Pennsylvania, Mr. Evans has won the Brook Gold Medal and the AIA Students Medal. He has the National Council of Architectural Registration Boards certificate. Prior to his City employment, he was in private practice. Earlier Evans served with the firm of Harbeson, Hough, Livingston and Larson of Philadelphia.

Thomas R. Simonson, San Francisco mechanical engineer, was elected President of the Consulting Engineers Association of California. John Q. Jewett, Long Beach civil engineer, was chosen Vice President and Hugh B. Brewster, structural engineer from Fresno, was re-elected Secretary-Treasurer. New board members include: Hugh C. Carter, Long Beach; Wallace L. Donley, Fresno; Glenn W. Smith, San Francisco; and William T. Wright, Los Angeles.

OFFICE ANNOUNCEMENTS

Burns & McDonnel Engineering Co., Consulting Engineers, have announced the admission of the following former staff members to partnership in the firm: Leo L. Cunningham, Civil Engineer; Jasper W. Meals, Civil Engineer; Alwin H. Rector, Electrical Engineer; William W. Rumans, Electrical Engineer; and Edwin J. Runyan, Civil Engineer.

Friedman, Alschuler & Sincere, Chicago architectural and engineering firm, announce the addition of Alexander Hale, AIA, to design staff. Graduating with honors from the School of Architecture of the University of Illinois in 1952, Mr. Hale served with both the Army and Navy during World War II and the Korean War. He has been associated with Perkins & Wills, Shaw Metz & Associates, Holabird & Root and Frisdstein & Fitch.

The engineering firm of Johannessen & Girand, Phoenix, Ariz., has moved to 6601 North Black Canyon Road in that city.

Richardson, Severns, Scheller & Associates, architects, announce the relocation of its office to 606 South Neil St., Champaign, Ill.

George Fuchs has been named Chief Engineer of the architectural firm of Samuel Paul & Seymour Jarmul. Mr. Fuchs was formerly with the New York City Department of Buildings where he was Chief Examiner and Senior Civil Engineer of the department's Queens office. Mr. Fuchs is a member of the Professional Engineers Society of New York, the Metropolitan Codes Committee and the New York City Municipal Engineers Society.

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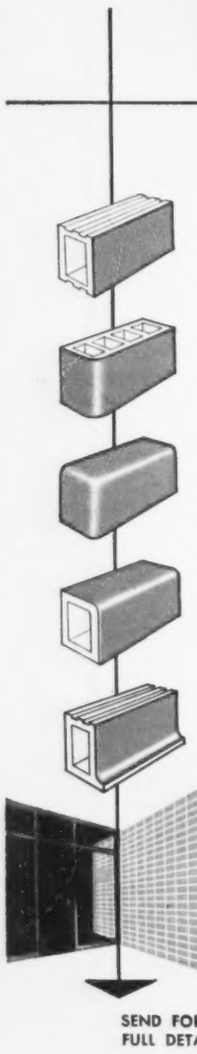

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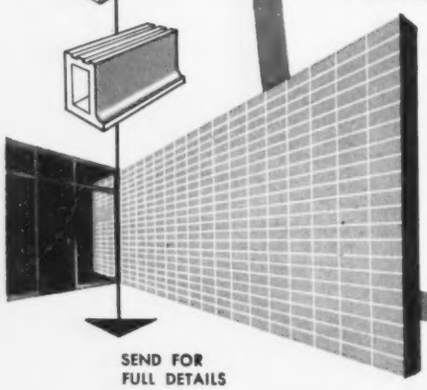

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FORECAST

NEW CONSTRUCTION PUT IN PLACE
1960-1961 COMPARISON (In Millions of Dollars)

PRIVATE CONSTRUCTION, FIRST QUARTER

1961		8,055
	−5%	
1960		8,482

PUBLIC CONSTRUCTION, FIRST QUARTER

1961		3,219
	+14%	
1960		2,818

TOTAL CONSTRUCTION, FIRST QUARTER

1961		11,274
	less than −1%	
1960		11,300

CONSTRUCTION FOR THE FIRST QUARTER, 1961

Spending for total new construction in the first three months of 1961 amounted to $11.3 billion, about the same as was spent during the same period last year. The largest change from a year ago was in *public* construction which was up 14 per cent. Other areas such as private construction declined somewhat to nullify the increase in public construction and leave the figures about unchanged.

New construction put in place

The value of total new construction put in place during March 1961 rose to $3.9 billion, up by 8 per cent which is the normal seasonal adjustment from February. This was about unchanged from a year ago.

Private construction

Total new private construction expenditures in March 1961 rose 7 per cent from February, about 1 per cent higher than the normal seasonal adjustment for this period. However this figure is still 4 per cent less than the total spent in March 1960 for new private construction.

Public construction

Total new public construction was 10 per cent greater in March 1961 than in the previous month, but 1 per cent less than the normal seasonal adjustment of 11 per cent for the period. However this is 13 per cent above the figure for March a year ago.

1961 steel shipment forecast

Total industry shipments of steel during 1961 are forecast as about the same as last year. Except for month-to-month adjustments in answer to seasonal demands, the steel industry generally expects no drastic change in shipments for steel this year unless the economy steps-up sharply. During the first three months of 1961 shipments followed their expected pattern.

Put-in-place construction figures are not based on direct measurements, except when special surveys are taken. They are derived primarily by applying standard progress patterns to the value of contracts awarded prior to the current month. These progress patterns reflect normal seasonal movements. In the case of new private dwelling units, the patterns are applied to the estimated value of housing starts prior to *and including* the current month. The estimates do not reflect varying number of working days to any given month, or the following special conditions likely to influence the volume of activity: unusual weather affecting earthwork, concrete pouring, delivery of materials and the like; overtime; postponements; material shortages and work stoppages. When the last two reach serious proportions, special surveys are usually made and applied to these figures.

Based on report from American Institute of Steel Construction, and "Construction Reports" issued by U. S. Department of Commerce, Washington, D. C.

A/E NEWS

AIA President Philip Will, Jr. (left), presents the 1961 Gold Medal of the American Institute of Architects to Le Corbusier at last month's Annual Convention in Philadelphia.

Philadelphia, 27 April 1961
Remarks by Le Corbusier following his acceptance of the AIA Gold Medal

Dear friends:
There is no Wing of Victory in this hall. There is no Wing of Victory in life. Great things are made from a host of little things, and those little things are everyday, successive, without end, from morning until night.
Daily life is made up of perseverance, of courage, of modesty, and of difficulties.
I am a little like St. Thomas, but minus the Saint. All my life I have been guided by the urge to "put my finger on it." I feel a little like a railroad conductor checking tickets. I only believe what I see; and to see everything in architecture is a dog's life.
The Queen of England has already given me a gold medal, and it was of an impressive thickness. I heard some very beautiful speeches. I was asked to answer. I had nothing prepared. I had in my pocket a little piece of paper from Paris which contained all the defeats of my life, and it has been the greatest part of my activity.
If you will excuse me, I am going to be very vulgar. One day in my studio in the Rue de Sevres, where I have worked for the past 40 years, I told my collaborators: "It is Le Corbusier who cleans the toilets at 35 Rue de Sevres, and that is why I am the boss."
Today's problems remain before us. The world is exploding: it is not only technology which changes every day.
I am now going to make my definitive confession: I live in the skin of a student.
Thank you.

Investiture of 46 new Fellows of the American Institute of Architects took place on the grand staircase of the Philadelphia Museum of Art during the AIA Annual Convention. To the left of Elanor Raymond, a new Fellow, is Morris Ketchum, Jr., FAIA, chancellor of the College of Fellows.

Last month's annual convention of the American Institute of Architects in Philadelphia was marked by a successful blend of substance and ceremony. Climax of the meeting was acceptance of the AIA Gold Medal by Le Corbusier, an architect familiar to many from photographs but to few in the flesh. He appeared at the convention hall upright of frame, determined of step and restrained in gesture. His after dinner remarks were in French, but his English was obviously good enough to correct an occasionally inaccurate rendition by the interpreter. The speech, reproduced in full elsewhere on this page, was marked by a combination of humility and a singularly realistic outlook on life. He received a rousing ovation from a packed ballroom as AIA President Philip Will, Jr., presented to him the Gold Medal on its scarlet ribbon. Earlier in the day, Le Corbusier had taken part in a session with students.

Of the ceremonial occasions, it is perhaps proper to stress two. First was the symphony concert at the Academy of Music, where acoustics are said to be the best in the country. Eugene Ormandy, still limping from a knee injury suffered in a recent car accident, conducted the Philadelphia Orchestra in a program of Bach, Beethoven, Ravel and Paul Creston. After the intermission, Mr. Ormandy was presented with the Honorary Gold Medal of the Philadelphia Chapter, AIA. This marked the first time the honor has been conferred on a non-architect. Another Gold Medal was conferred upon Edmund R. Purves, FAIA, recently retired AIA Executive Director, and awards were presented to the incumbent and past Chancellors of the College of Fellows. The concert was a gala affair, specially arranged in honor of the convention, and was followed by a formal ball at the Bellevue Stratford Hotel.

Investiture

A second ceremony took place the following day upon the grand stone staircase of the Philadelphia Museum of Art. The occasion was the investiture of 46 newly elected Fellows of the Institute (See list in April A/E NEWS). Before an audience which included many ladies, the newly elected Fellows appeared, one by one, as their names were called, at the first landing after waiting on an upper level. Each was then formally introduced by name, chapter and achievement, welcomed into the College of Fellows by its Chancellor, Morris Ketchum, Jr., who presented the medallion and ribbon, and greeted by President Will. The new Fellow was then escorted down the remainder of the monumental stair by a student. There was one lady Fellow, Elanor Raymond, of Massachusetts. The investiture was followed by the President's reception at the Museum.

Dr. Weaver

The formal business of the Convention, based on the theme "Redesigning Urban America" began with reading of a message of greetings from President John F. Kennedy, and an address by Dr. Robert C. Weaver, Administrator of the Housing and Home Finance Agency. Dr. Weaver came directly from a news conference where he had fielded questions with dexterity and good humor. Most questions centered upon the proposed Department of Urban Affairs and Dr. Weaver's role in it; upon the latter point he was not prepared to commit himself. Dr. Weaver in his speech brought out the dichotomy existing in our society between urban and suburban thinking, and stressed the need for revitalizing our cities as "the anchor holding together our metropolitan areas."

Sir William Holford

Sir William Holford, Hon. FAIA and president of the Royal Institute of British Architects, centered his speech upon the problems of transportation, particularly as they affect the pedestrian: ". . . except as a pedestrian, you cannot experience architecture. And without architecture, there is little point in the city as a form of civilization and culture." He defined this as the problem of *deceleration*, and went on to quote a remark by A. P. Herbert, who said recently that it was all very well to shoot a man into space, but that "we pedestrians are more interested in being able to cross the road safely." After discussing various of his own planning projects, including planning of the area around St. Paul's in London, Sir William talked about one or two major overseas schemes, including Brasilia, which he praised as "a CITY —a true metropolitan capital city . . . conceived suddenly in 1957, and after three years of stupendous labor, born fully fledged . . ."

Speaking of scale in the city, Sir William raised the point that whereas formerly it was the large city buildings which attracted attention

(Continued on page 6)

A|E NEWS

(Continued from page 5)

(cathedrals, museums and railroad stations), today "it is the special buildings, low in height and human in scale, those that can afford to include some public space in their complex, that appear like jewels in an otherwise drab and overpowering setting."

Bruno Zevi

For those who thought the eloquent gesture a lost art, Professor Zevi's provocative address was an enlightening dramatic experience. His theme was the importance of thinking of urban planning in three dimensions, and he stressed that the architect was the only person qualified by training and experience to set the pace in this field.

"The architectural profession," he said, "is evidently conscious of the new role it is called upon to fulfill in the national task of redesigning urban America. Indeed, the very significance of the architectural profession is at stake. In the process of city-making, there is no second, third or fourth place that architects can occupy; either they come in first, or they are going to be the last. Either they promote or they become the passive reflection of a distintegrated city life."

Prof. Zevi also warned that if cities are to survive as cultural instruments they must be more than a collection of public works projects. Expressing doubts as to the universal validity of formulas and theories today, Prof. Zevi proposed instead a massive exchange of experiences and information, not through present international bodies which, he said, are "paralyzed by the principle of non-intervention," but rather at the level of the architectural profession, "anti-bureaucratic, quick to intervene in every part of the world, around a drawing board, with pencils in hand."

Lewis Mumford

Bruno was succeeded at the rostrum by Lewis Mumford, writer, critic, and an equally forceful speaker. Defining the city as an aesthetic experience and "a place for multiplying happy chance meetings," Mr. Mumford declared that there was no sense to discussing the culture of the city if "the city itself is about to vanish, either by being thinned out into a suburban conglomeration, by being completely destroyed by nuclear bombardment or by our digging vast underground cities, bargain basements for those

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who prefer collective entombment."

"The city," Mr. Mumford went on to say, "is a human artifact and must give form to human needs and human purposes in the order of their importance, beginning with man's needs for fellowship and love, for biological reproduction and psychological development. Technological improvements exist only to serve more essential aspects of man's life, not to dominate them."

The Philadelphia Plan

Redesigning Downtown Philadelphia was the topic of an extensive presentation made to the Convention the following morning by Edmund N. Bacon, executive director of the City Planning Commission, with the assistance of Wilhelm von Moltke, its chief designer, Roy F. Larson, FAIA, Vincent G. Kling, FAIA, Oskar Stonorov, FAIA, Robert L. Geddes, and I. M. Pei.

The presentation included recorded statements by civic leaders, as well as an address by Mr. Bacon, in which the latter brought out, with the help of colored slides, the thesis that great architectural design has always dealt with the problem of relating buildings to each other and with the design of the larger environment, and "that the new elements of urban renewal, far from being a disaster, make possible for the first time in this century the achievement of the immemorial assignment of our profession." Details of the Philadelphia planning program appeared in April A/E NEWS.

Gropius degree/Pei award

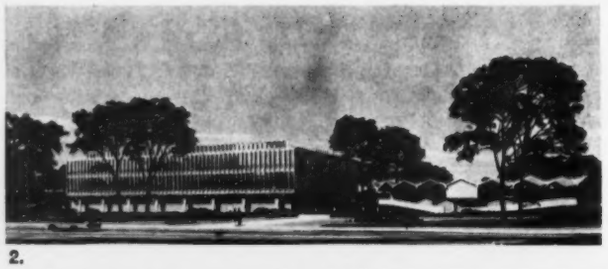
Walter Gropius, FAIA, was awarded an honorary degree of Doctor of Humane Letters by Columbia University last month. Columbia's honorary degree was conferred at a university convocation, held in conjunction with the School of Architecture's current program honoring four contemporary architects.

The 1961 Brunner Award, an annual $1,000 prize given by the National Institute of Arts and Letters for excellence in architecture, will be awarded to Ieoh Ming Pei, of I. M. Pei and Associates of New York.

Mr. Pei studied at the Massachusetts Institute of Technology and then at the Harvard Graduate School of Design, where in 1946 he received his master's degree in architecture. He also taught at Harvard.

(*Continued on page 8*)

1.



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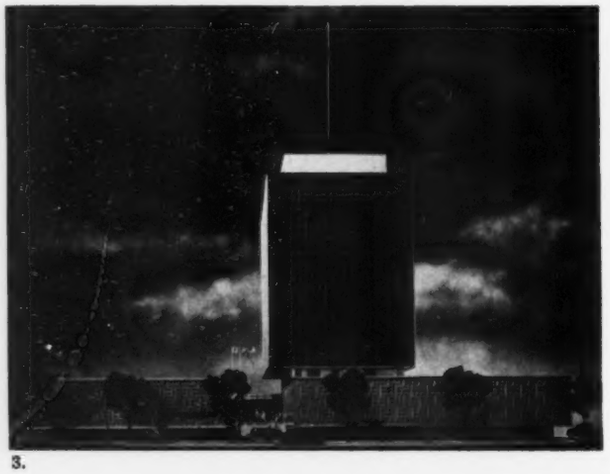


3.

1. Construction begins next year on the City of Philadelphia Municipal Services Building designed by Vincent G. Kling, FAIA. The 21-story tower takes the form of a symmetrical Greek cross with cantilevered outer walls.

2. A three-story physics laboratory and a 300-seat physics lecture hall designed by George E. McDowell and Stanley J. Goldstein, is planned for Rutgers University. Cost of the project is estimated at $1,830,000.

3. The New York architectural firm of Kelly and Gruzen have designed the new city hall for Canton, Ohio. Recently completed, the $3.5 million dollar building features an 8-story tower and extensive use of stainless steel. Associate architects were Cox and Forsythe of Canton.

A|E NEWS

(Continued from page 7)

Appointment/award

Matthew L. Rockwell, AIA, architect, planner and professional engineer of Winnetka, Ill., has been appointed Director of the AIA Division of Public Affairs.

Edmund R. Purves, FAIA, former Executive Director of AIA and now its Consulting Director, has been named as 1961 recipient of the F. Stuart Fitzpatrick Memorial Award, given each year for "outstanding individual achievement in the unification of the building industry."

AIA products register

The 1961 edition of the AIA Building Products Register will be published this summer with major improvements in format and product listings which are planned to double the number in last year's first edition.

The 1960 Register was published by AIA following ten years' study by practicing architects of how to fill the need for a single reference book which would provide comparative information on building products.

Building product centers

Plans for the construction and operation of a national network of building product exhibit and market development centers were revealed recently by M. E. Puddington, President of Showcase, Inc., of Birmingham, Mich. The centers, to be called "Showcases" will be built within Kaiser Aluminum domes and will be located in 30 major marketing areas throughout the United States. First Showcase (to be built in a "Showdome") will be erected this year in Detroit. Besides serving the Greater Detroit Metropolitan area, it will also be national headquarters of both Showcase, Inc., the development and management organization, and Showdome, Inc., a new corporation set up to handle construction, licensing and leasing arrangements.

Showcase will serve manufacturers and builders by collating and centralizing the primary marketing efforts for products and services in the industrial, commercial and residential areas of building. It will offer permanent product exhibit space, a new film service on building products, informational services, market research and related promotional services on a year-round, nationwide basis. In addition, showcase centers will have trained personnel to answer product questions, provide literature, demonstrate equipment, forward "leads," and furnish the names of sources of the various products.

Building of the Detroit Showcase is to start shortly, with completion scheduled for next January. Present plans call for the construction of all 30 local Showcase facilities to be completed by late 1963.

The structures, to be built and owned by Showdome, Inc., will use specially designed 64-foot high Kaiser Aluminum domes having a diameter of 210 feet and providing over 35,000 square feet of open floor space. The domes are geodesic types, and were pioneered by R. Buckminster Fuller.

Survival seminars

Pennsylvania State University will offer during the coming summer, three seminars in the areas of atomic shelter and survival in the nuclear age.

The first of the seminars, planning aspects of atomic shelter, July 9 through July 21, is for architects and engineers who are or will become involved in planning and preliminary design aspects of buildings, shelters, and facilities to resist the effects of nuclear weapons.

The course will include a summary of effects of atomic weapons, including blast and nuclear and thermal radiation, functional requirements for protection, relationship of various protection criteria to total system planning, planning of integrated shelter systems including architectural, structural, electrical, mechanical, and sanitary sub-systems. Enrollees should have a technical background equivalent to a bachelor's degree in architecture, architectural engineering, or engineering.

The second event, structural engineering aspects of atomic shelter, will be a short course for structural and architectural engineers involved in the analysis and design of structural systems and radiation shielding systems of buildings, shelters, and structures. It will take place July 23 to August 4.

The third seminar, to be held August 13 to 18, is titled, survival in the nuclear age—executive management. It is intended for executives, architects, engineers, and others in management responsible for the administrative planning of industrial, governmental, municipal, hospital, and other facilities and complexes for the incorporation of protection against the effects of nuclear weapons.

Further information may be obtained from the Shelter Research and Study Program, 133 Hammond Building, The Pennsylvania State University, University Park, Pa.

Engineering seminars

Four basic areas of study will be covered during an engineering seminar on structural aspects of architectural engineering to be held at Pennsylvania State University, September 10 to 15.

These areas are analysis and design of structural systems, fire protection aspects of structural systems, modular coordination, and new developments.

Enrollees should have the equivalent of a bachelor's degree in architectural or structural engineering to obtain the maximum benefit.

Seminar co-chairmen are Gifford H. Albright, associate professor of architectural engineering, and Melvin W. Isenberg, associate professor of architectural engineering.

Further information may be obtained from Architectural Engineering, 133 Hammond Building, The Pennsylvania State University, University Park, Pa.

Grand Central's problems

Governor Nelson Rockefeller of New York was called upon recently by the New York Chapter, AIA, to help find a solution to the New York Central System's financial problems which would not entail the destruction of Grand Central Station, cited as one of the chief architectural treasures of the city, state, and nation.

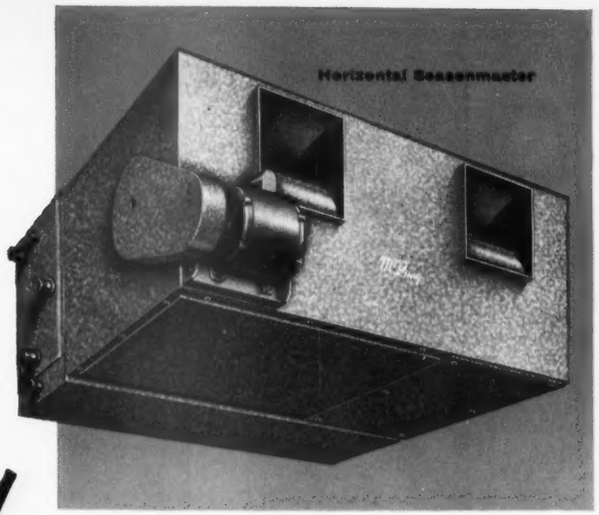
In a letter to Governor Rockefeller, Frederick J. Woodbridge, Chapter president, said that the railroads proposal to drop the ceiling of the waiting room so that it could use the air space above for bowling alleys and fight arenas "would diminish the noble character of this national monument, in the search for quick revenue."

The Chapter stated that no lasting solution to the problem was reached when the New York Board of Standards and Appeals unanimously denied the railroad's proposal to use the space above the waiting room for bowling alleys and fight arenas.

ASCE convention

The national convention of the American Society of Civil Engineers was held April 10-14 in Phoenix, Ariz. More than 150 papers were presented at 45 sessions during the meeting, the theme of which was water resources.

(Continued on page 10)



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A|E NEWS

(Continued from page 9)

The technical program was supplemented by several field trips, one of which visited the site of construction of Glen Canyon Dam, one of the newest of the projects of the Bureau of Reclamation.

The professional status of the engineer was put under scrutiny at a convention meeting of the Department of Conditions of Practice, which is concerned with the professional aspects of the Society. At this meeting James M. Gongwer of Chevy Chase, Md., said that "we must ultimately decide whether we are professional men or business men."

He said this was the "fundamental issue" in the Society's objections to one provision in the so-called Model Law for engineering practice as set forth by the National Council of State Boards of Engineering Examiners. This provision would permit the formation, and practice, of an engineering firm when only one member of the firm is a registered engineer. He said there was nothing in the provision which would prevent the names of non-engineers appearing in the firm name of a corporation.

"The objection is not what engineers do, but what non-engineers might be permitted to do under the law," Mr. Gongwer stated.

The problem of dwindling enrollments in many engineering schools throughout the country, was dealt with by Glenn W. Holcomb of Corvallis, Ore., President of the Society, in his annual address. He stated that he believed that entrance requirements should not be set so high as to attract only the student destined for graduate study.

Rather, he stated, standards should be so regulated that the nation will have an adequate supply of engineers, which he rated at 80 to 85 per cent of the total, who can plan structures, design them and build them. These he referred to as practicing engineers, as compared to the graduate group, who generally become research engineers and teachers.

G. Brooks Earnest, President of Fenn College, Cleveland, Ohio, in his convention address proposed that ASCE should direct is professional attention to increasing the demand for civil engineers because of the many engineering projects which need development.

AN AUDITORIUM FOR EVERY USE: CAN IT BE BUILT?

by David L. Klepper*

The acoustical problems in the multi-purpose hall increase with the degree of flexibility required of the hall, but the basic principles of good hearing remain the same. They are: exclusion of external noise; satisfactory loudness in all seats at all frequencies; proper distribution of sound; and adequate separation of notes and syllables. More and more multi-purpose halls are being planned throughout the country, and the author here discusses solutions to acoustical problems inherent in the requirement for flexibility.

The word "auditorium" has been employed to describe a great variety of spaces, including anything from a small 200-300 seat lecture room or theater to 10,000-15,000 seat coliseums and exhibition halls. What are some of the events that people are hopeful will be accommodated by these buildings? We may list the major ones as follows:

1 Lectures
2 Drama
3 Musical comedy
4 Opera
5 Instrumental recitals and chamber music
6 Vocal recitals
7 Orchestral concerts
8 Choral concerts
9 Organ recitals
10 Trade show and exhibitions
11 Conventions
12 Boxing and wrestling matches, basketball, ice hockey, and other team sports
13 Rodeos, circuses, etc.

The first group of activities, 1 through 9, may be grouped as the cultural events that are of primary benefit to the population within the city and its environs. The next group, 10 and 11, are activities which most often provide the economic justification for constructing such a building and securing backing by business interests; it is hoped that exhibitions, trade shows and conventions will lure people to the city, increasing the income of its residents. The last group includes those spectator sports that are of primary interest to the city's population, but again it is expected that certain of these activities will draw people from considerable distances. In general, we may say that the first group of activities are seldom self-supporting, while the latter two groups invariably are.

Mr. Klepper has been associated with Bolt, Beranek and Newman, Inc., Acoustical Consultants, since 1957. He holds B.S. and M.S. degrees in electrical engineering from Massachusetts Institute of Technology.

Acoustical requirements

In discussing a building designed to accommodate a large number of these activities, we may first review the different acoustical requirements. These acoustical differences are, of course, only part of the problem an architect faces when he attempts to design a space flexible enough to be used for a large number of activities. These differences have their influence on acoustical criteria, and it is the acoustical criterial that are perhaps the least obvious.

The acoustical environment for these activities should provide adequately for live and amplified sound. Sports events require only announcements which can conveniently be made over a well-designed public address system. Trade shows, exhibitions, and conventions, may include speech and music activities requiring good hearing conditions for both, but no one will object to the use of sound amplification as necessary for these activities. Sports coliseums and exhibition halls may, therefore, be large enough to be economically feasible without hearing conditions necessarily being compromised. The acoustical design of these spaces remains comparatively straightforward requiring only:

a The proper location, orientation and selection of loudspeakers and other sound amplification system components,
b adequate quieting of noise from mechanical equipment and outside the building, and
c suitable treatment of the interior surfaces of the space to insure control of reverberation and elimination of echo.

There is, in any case, no inherent acoustical limitation on the size of such sports coliseums and exhibition halls.

It is for cultural activities that "quality versus quantity" becomes an important consideration. These activities use sound amplification only incidentally to supplement natural sound. Even when the acoustical engineer has complete control over the shaping and materials of the interior surfaces, there is a maximum size "house" for any of these activities, above which quality will fall off.

The equations illustrating the relationship of sound intensity level to the absorption present in the room and the power level of the sound source are available in acoustical textbooks. We can easily realize, however, that any sound source, whether it is a human voice, a violin, or a whole symphony orchestra, is capable of producing only a given amount of sound power, and that a larger capacity auditorium, with a greater amount of sound-absorbing audience, will result in a lower average sound intensity level at the ears of the audience. All the cultural activities we are discussing, from lectures through dramatic presentations and opera performances to orchestral concerts, require the listener to hear the program over a wide dynamic range. When an actor shouts he should be heard *loudly;* when an orchestra plays fortissimo, it should be heard fortissimo. Likewise, when the actor is whispering, his voice should continue to be heard intelligibly by the audience, and a pianissimo orchestral passage should not disappear into the audience background noise or the background noise of a ventilating system.

Background noise

Too much stress cannot be placed on background noise as being a determining factor in the maximum size of an auditorium for "live" activities. Not only must we consider the background noise within the auditorium, but the noise environment the audience is accustomed to in the auditorium's surroundings. A 6000 seat concert hall is successful at Tanglewood primarily because the concertgoer has grown accustomed to the absence of normal city noises and Tanglewood's Berkshire Mountain environment. A low background noise level within the Music Shed, resulting both from the attentive audience and the avoidance of any mechanical air handling system, then allows the softest pianissimo passages to be heard clearly by the entire audience within the Shed and the contrasting fortissimo passages to be heard as loud, even though the actual loudness levels achieved in the hall are 8 or 9 db less than those heard by listeners in Boston's Symphony Hall.

Work on a wide variety of auditorium projects has suggested the following guide for the *maximum* size "house" that will allow optimum hearing conditions without amplification for various uses.

	SEATS
1 Lectures	1200
2 Drama (assumes trained actors)	1800
3 Musical comedy	2100
4 Opera	2200
5 Instrumental recitals and chamber music	1500
6 Vocal recitals	2200
7 Orchestral concerts	2200
8, 9 Choral concerts and Organ recitals (depends greatly on size of choir, type of organ, period of music, etc.)	not determined

(*Continued on page 12*)

THE FLEXIBLE AUDITORIUM

(*Continued from page 11*)

The above seating capacities are only to be taken as a rough guide. They are based upon modern seat spacing; more people can be accommodated with no real change in the acoustical characteristics if the tighter and less comfortable seat spacing of older halls is employed. Larger houses that are successful are, of course, possible, but the compromises inherent in larger auditoriums are illustrated by the fact that most actors, conductors, and informed critics rate as acoustically excellent only those halls with seating capacities not exceeding the ranges listed above.

Reverberation time

We can see that even with the "cultural" uses of an auditorium there are certain conflicts as to the proper size. There are other acoustical conflicts as well. The optimum reverberation time differs for auditoriums having different uses. Considerable experience in the design of auditoriums indicates the following optimum mid-frequency reverberation times again as a rough guide:

	SECONDS
1 Lectures	0.9 - 1.1
2 Drama	0.9 - 1.5
3 Musical comedy	1.2 - 1.5
4 Opera	1.5 - 1.8
5 Instrumental recitals and chamber music	1.4 - 1.8
6 Orchestral concerts	1.8 - 2.0
7 Vocal recitals	1.5 - 1.8
8, 9 Choral and organ concerts (the upper limit depends largely upon period of music, etc.)	2.0 minimum

Note that the figures above are for the mid-frequency reverberation time in the frequency range 500-1000 cps. The spaces for music performance should generally have a higher reverberation time at lower frequencies, and nearly any auditorium will have a lower reverberation at higher frequencies.

The lower values of the reverberation time ranges suggested above are for comparatively small auditoriums, approximately 1000 seats or less, while the higher value in each case is for the largest size considered optimum for the particular use. Again, we must remember that these are a general guide to optimum reverberation times and that satisfactory (as opposed to outstanding) results can be obtained outside of the above values.

Reflection and diffusion

We discussed the conflicts that arise concerning optimum size and optimum reverberation time for the different "cultural" uses of a multi-use auditorium; now let us review two other conflicts worth mentioning. Orchestras and choruses must be surrounded by a heavy sound-reflecting enclosure. In addition to reflecting sound to the audience, this enclosure should be carefully designed to mix and blend sound energy so that the conductor or any member of the audience hears the entire orchestra or chorus, not just a portion of it. Heavy enclosures are necessary to reflect (and therefore mix and blend) low frequency sound energy in addition to high frequency sound energy. Yet, the entire enclosure must be moved out of sight and out of the way to permit the employment of scenery for drama, opera, or musical comedy.

More subtle than any of the three previously mentioned conflicts is the difference in the directional characteristics of the sound energy arriving at the listener's ear that is optimum for these various uses. Speech activities are most intelligible and most natural sounding when all sound energy appears to come from the direction of the person speaking, while the emotional impact of orchestral, choral, or organ music is greatest when a listener is literally surrounded by sound. This does not mean that a listener should hear a rear wall echo, but researchers in concert hall acoustics both in Europe and in this country have found that some return of sound energy from the rear of the hall to the listeners' ears creates a desirable subjective liveness apart from the liveness associated with the room reverberation time. By careful design, such a return of sound energy is possible *without* an obvious echo.

On the other hand, the sound-reflecting surfaces most important to high speech intelligibility as well as music intelligibility (sometimes called "definition") are those that provide "close-in" reinforcement of sound from the front of the auditorium. By "close-in" we mean that the reflected sound energy should reach the listeners' ears within 30 milliseconds after the direct sound energy. Suspended sound-reflecting panels are often required to provide this reinforcement.

To illustrate possible acoustical design solutions to the conflicting requirements of a multi-purpose auditorium, we shall review two typical projects. The first, a 10,000 seat "auditorium," provides means for presenting cultural activities, with satisfactory results, in a building designed basically for sports, exhibition, and convention events. The second, a 2700 seat auditorium, illustrates methods for assuring really good hearing conditions for a variety of cultural activities in one auditorium.

10,000 SEAT AUDITORIUM

Support for this hypothetical project was enlisted from citizens interested in furthering the city's cultural activities, in improving facilities for spectator sports, and in providing facilities for conventions, trade shows and exhibitions. Fortunately, the building is located away from airports, primary waterways, or railroad lines, and the site does not pose any particular problems for isolation of exterior noise. Also, the architect has decided to avoid a shape inherently unsatisfactory acoustically, such as a dome, thus simplifying the acoustical engineers' task. (*See plan and section, page 18.*)

In general, the wall and ceiling surfaces of a large coliseum or exhibition building are too far away from the performers or audience to act as useful sound-reinforcing surfaces. Sound energy reflected from these surfaces is heard as an echo, interfering, rather than reinforcing speech intelligibility. The basic acoustical design of this space, therefore, includes the treatment of as much as possible of the interior boundary surface of the room with sound-absorbing material.

The ceiling is constructed entirely of a sound-absorbing formboard. The material serves an acoustical function in addition to a structural function. The absorption coefficient of this material is sufficiently high (.50 to .70 in the mid-frequency range) to eliminate any possibility of echoes from the ceiling. Interruption of this sound-absorbing treatment by concrete beams or roof trusses or the sound-reflecting panels hung vertically is not particularly critical in terms of the area occluded. This material may be employed as formwork for a poured concrete ceiling and then left in place, or, alternately, it may be employed as the structural ceiling material, spanning up to 3 ft. gaps between roof joints, with the visual built-up roofing above.

Considerable wall treatment is required to eliminate echoes both from the announcements of sports events, exhibitions, etc., and for stage production. It is very important that the sound-absorbing treatment be reasonably efficient throughout the speech frequency range (300-4000 cps), and this requirement rules out most of the "applied" materials such as acoustic plaster.

With the majority of the wall and ceiling surfaces treated, we can be sure that the acoustical properties of this large space will somewhat approximate that of the outdoors. This is the best we can hope for in the large exhibition hall, sports, or convention space; but it is not the desirable acoustical environment for either a theater or a concert hall.

Movable enclosures

Conversion of this large "outdoor-like" space into a theater or opera house can be accomplished to some extent by the use of suspended sound-reflecting panels and portable or movable side walls that actually form a lower and narrower sound-reflecting enclosure when the space is used for important stage productions. A third movable device is the stage orchestral enclosure which is employed along with the suspended panels and movable side walls in the main space for orchestral, choral, or chamber music concerts.

Let us explore the reasons why these three elements must be made movable. The suspended sound-reflecting panels are designed to provide optimum reinforcement from the stage end of the space. Therefore, when they are lowered, the room assumes a non-symmetrical appearance undesirable for athletic and exhibition events. To increase the amount of ceiling sound-absorbing treatment exposed, they are hung vertically for sports, convention, or exhibit activities.

The movable side wall panels actually eliminate about 1000 seats when they are in place for theatrical or concert activities. Loss of these seats for such activities is, if anything, desirable since these seats are too far to the sides of the stage to be satisfactory either acoustically or visually. The sound-reflecting side walls must be movable, however, to allow these seats to be used for sports events, conventions, exhibitions, trade shows, and similar activities.

The heavy stage enclosure that forms the "hard sending end" for an orchestra or choral group must be removed to allow the stagehouse to be used for stage productions requiring scenery. These activities include not only legitimate drama, musical comedy, and opera, which will continue to employ the movable walls and ceiling panels in the main space, but also include certain stage productions that will rely on sound reinforcement to provide a satisfactory acoustical environment during conventions and trade shows. The stage itself must be capable of handling anything from automobiles to singers!

In our example, the suspended sound-reflecting panels are lowered in place by the use of pulleys mounted in the truss space immediately below the roof. Whether in the raised or lowered position, the suspended sound-reflecting panels form the "visual" ceiling of the auditorium, with the truss space above painted flat black. Lighting is accomplished by fix-

(*Continued on page 17*)

Circle 106 for further information about WESTERN PINE, pp. 13-16→

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Lengths: 6′ to 16′		Standard Thickne	
Shiplap		*Tongue and G*	
Face Widths		*Face Width*	
Nominal	*Dressed*	*Nominal*	*D*
6	5	6	
8	7	8	
10	9	10	
12	11	12	

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8	7¼	8	7⅝
10	9¼	10	9⅝
12	11¼	12	11⅝

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6" or 25/32" ximum width 12"	25/32" only Maximum width 12"
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	6"	8"	10"	12"
	1.25	1.20	1.17	1.14
	1.28	1.23	1.20	1.17
	1.22	1.19	1.16	1.13
	1.25	1.21	1.19	1.17
	1.16	1.14	1.14	1.13
	1.19	1.17	1.17	1.16

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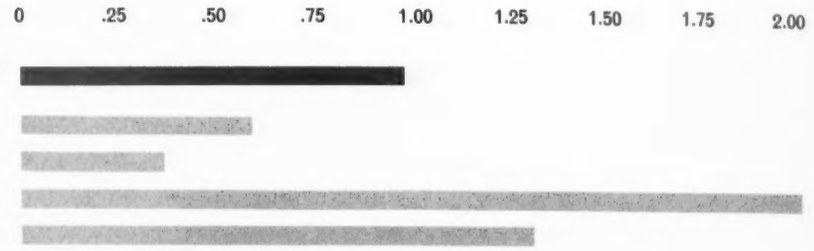

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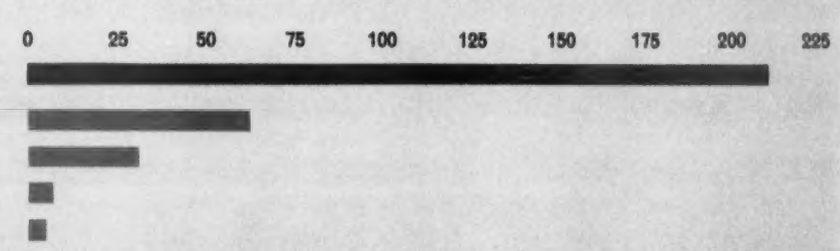

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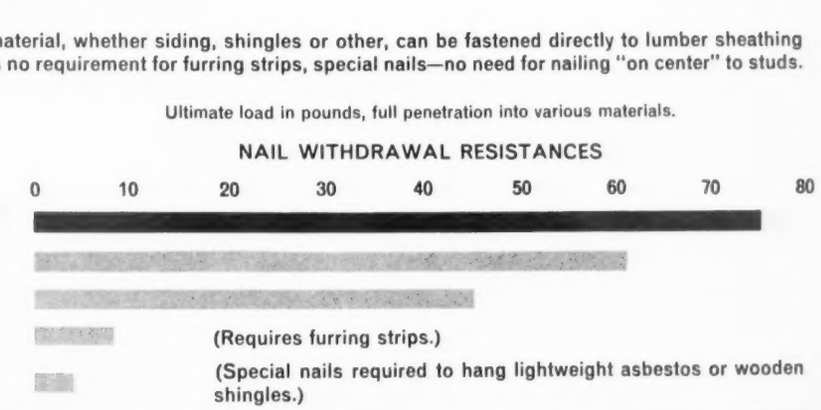

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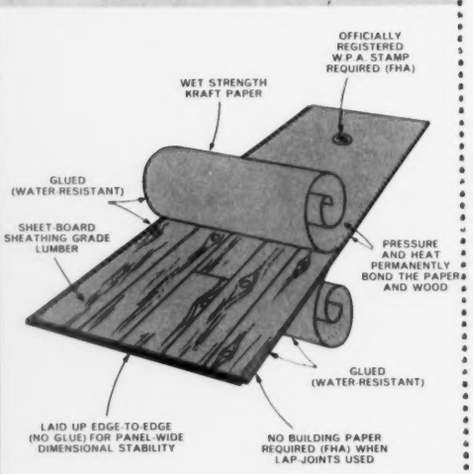
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THE FLEXIBLE AUDITORIUM

(Continued from page 12)

tures mounted within the sound-reflecting panels and by fixed down-lights suspended from the ceiling structure. Air is supplied to the clear space above the sound-reflecting panels. The weights of these sound-reflecting panels are determined by the requirement that they must reflect low frequency sound energy, down to 35 to 50 cps for orchestral music.

Similar weight requirements exist for the sound-reflecting movable side walls. Here, these panels are all oriented vertically, the solution employed uses hung sound-reflecting lead impregnated draperies having a surface density of approximately 3 #/sq. ft. These "hung walls" are cut to fit the seating slopes as required, are hung in place when the auditorium is used for cultural activities, and are stored elsewhere during other uses.

The stage

The movable orchestral stage enclosure employed in this auditorium comprises wall panels and the ceiling panels. The sides and rear walls of the enclosure are made up of a series of hard wood panels each 5 ft. wide and 30 ft. tall. Braces are located at the back of these panels. Underneath the panels are frameworks incorporating four small wheels allowing the walls to be wheeled into position by two men. These wall panels are useful for other events besides orchestral and choral concerts. They can be used to provide a shallow enclosure, without a ceiling, for a solo singer or instrumentalist. They are far superior to sound-absorbing draperies as a back drop for jazz and popular musicians, providing mixing and blending of sound energy that is desirable even when amplification is employed. The number of combinations in which they may be employed, either by themselves or with the suspended stage sound-reflecting panels is too numerous to mention, and every stage show suggests new possibilities for their use.

The suspended sound-reflecting stage enclosure ceiling panels are constructed of ¾" plywood, fireproofed. These are lifted high in the stagehouse and hung vertically when they are not in use to free a maximum amount of space for hanging scenery. Only half the number of stagehouse lines are required to carry them when they are hung in this position as compared with the nearly-horizontal position they assume when in use.

What kind of results can the audience within this auditorium expect? Certainly, the acoustical environment of the hall will not be identical with the finest concert halls or opera houses, buildings specifically designed for particular purposes. However, listeners in the forward half of the auditorium will hear a mixed and blended sound from an orchestra or choral group, or a warm sound from an opera singer enriched by the multiple sound reflections from the wall and ceiling panels that will be quite satisfactory. Even actors should be heard clearly, without sound amplification, by a majority of listeners in these forward seats. Amplification will, of course, usually be required to allow everyone throughout the auditorium to hear clearly, but this amplified sound will only reinforce, not replace, the live sound. With careful design and operation of the system, the audience need not even be aware that the sound is being amplified. The location of the loudspeakers for reinforcement of stage pro-

(Continued on page 18)

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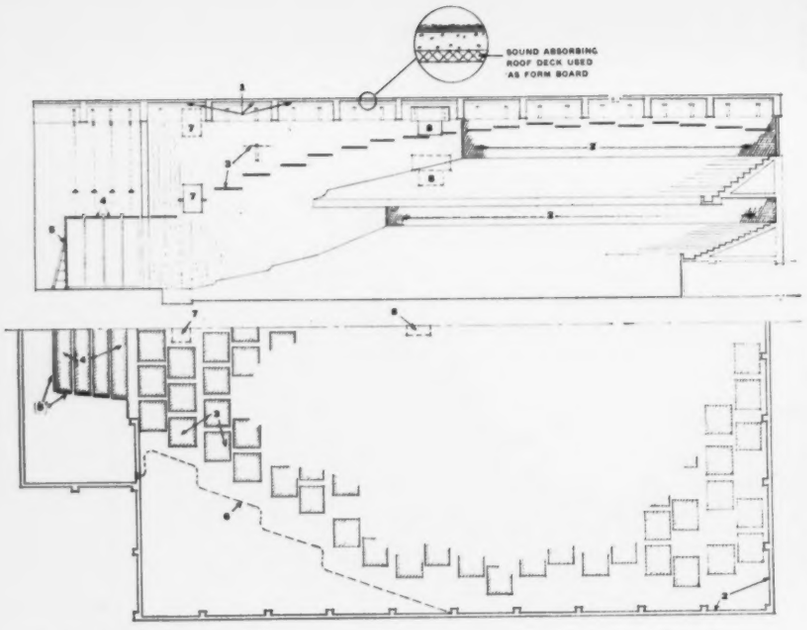


FIGURE 1—PLAN AND LONGITUDINAL SECTION OF THE 10,000 SEAT AUDITORIUM.

Acoustical measures include:

1. Sound-absorbing formboard roof deck.
2. Sound-absorbing rear wall and side wall treatment.
3. Suspended sound-reflecting ceiling panels shown (solid) in lowered position and (dotted) in raised position.
4. Ceiling of orchestral stage enclosure shown (solid) lowered and (dotted) raised.
5. Walls of orchestral stage enclosure supported on wheels for ease of removal.
6. Removable side walls constructed of lead curtain material.
7. End or proscenium loudspeaker cluster for reinforcement of stage activities.
8. Central loudspeaker cluster for amplification during sports and arena events.

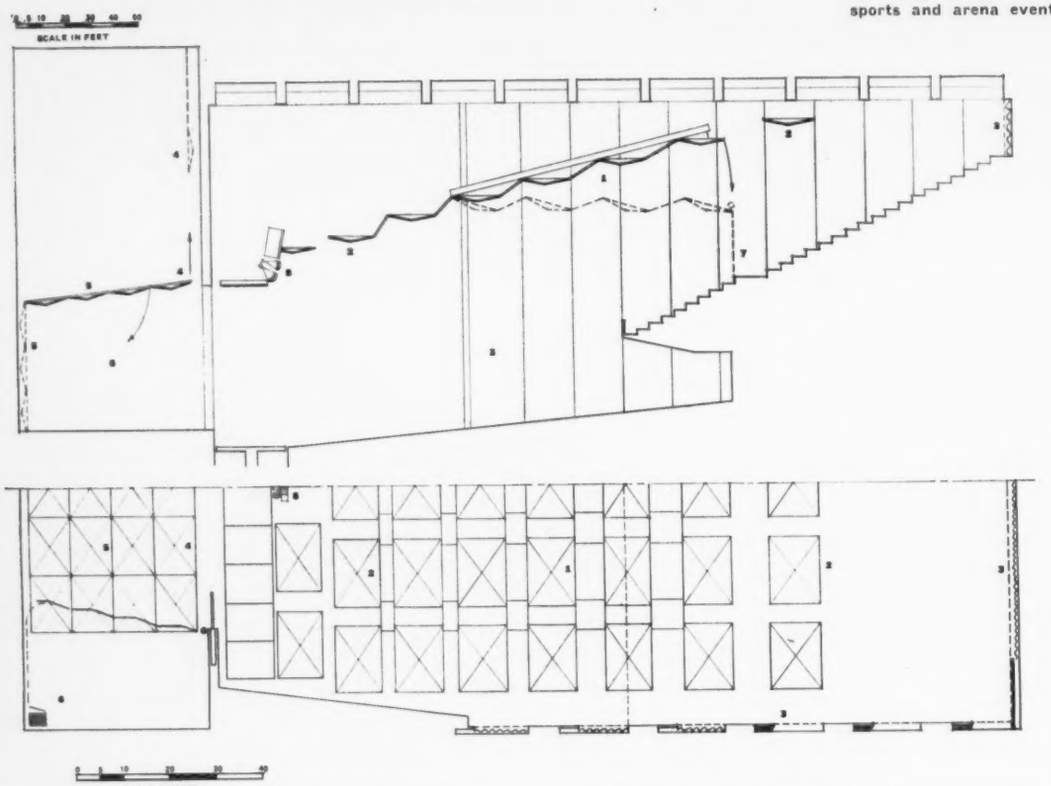


FIGURE 2—PLAN AND LONGITUDINAL SECTION OF THE 2700/1600 SEAT AUDITORIUM.

Acoustical treatment and adjustable features include the following:

1. Hinged sound-reflecting ceiling panels shown (dotted) in the lowered position and (solid) in the raised position.
2. Fixed sound-reflecting ceiling panels.
3. Adjustable side wall and rear wall sound-absorbing treatment (for lower drape).
4. Forward portion of stage enclosure ceiling shown (solid) in place and (dotted) flown in stagehouse.
5. Rear portion of orchestral enclosure ceiling shown (solid) in place and (dotted) folded against rear wall of stagehouse.
6. Side walls of stage enclosure shown (solid) in place and (dotted) stored on track in stagehouse wing.
7. Sound-transparent rear wall curtain shown (dotted) in position hiding rear 1100 seats.
8. Central loudspeaker system for reinforcement of stage activities.

Definition:
The reverberation time is defined as the time required for the sound energy density to decay 60 db, that is to 10^{-6} of the original value.

THE FLEXIBLE AUDITORIUM

(Continued from page 17)

ductions, at the center of the proscenium opening, will help this illusion.

Other events

When non-cultural, mass-audience events take place in this hall, the sound-reflecting side walls will be removed and the sound-reflecting ceiling panels will be raised. This will be not unlike the outdoors, and hearing conditions will depend upon the proper installation and operation of the sound amplification system. Two distinct sound-reinforcing systems are available for use during these activities. One is the loudspeaker cluster located over the center of the proscenium opening, used for reinforcement of cultural activities and also usable for stage productions in conjunction with exhibits or trade shows. For announcements, background music, etc., a central loudspeaker cluster will be used.

2700 SEAT AUDITORIUM

The other typical auditorium shown was planned on a more realistic basis. The basic decision to "separate the aesthetes from the athletes" was made in the basic planning stage, and the auditorium is to accommodate only the city's cultural activities.

In a building *primarily* for cultural activities, the citizens expect somewhat better results than merely a "satisfactory" auditorium or concert hall; they expect a *good theater* and a *fine concert hall*, despite their being combined into one building.

The auditorium is designed to accommodate a 2700 seat audience, the largest expected for tour concerts of major symphony orchestras or performances by regional opera groups. The entire capacity of the hall is also expected to be employed by touring musical comedies. Because of the importance of concerts in the cultural life of this city, the interior design has been based upon the most successful concert halls, and the auditorium, as set up for orchestral or choral concerts, is basically a long, hard rectangular box with sound diffusing and scattering splays on ceiling and wall surfaces. Two elements, the suspended sound-reflecting ceiling panels and a movable orchestral stage enclosure are somewhat similar to the large 10,000 seat auditorium discussed earlier.

For use as a more intimate theater or chamber music recital hall, the auditorium's sound-reflecting ceiling panels are lowered to reduce the visual and acoustical height of the auditorium, and a visual screen is used to close off the upper portion of the balcony. Now, as a 1600 seat hall, the sight line from the most distant member of the audience is less than 100 ft. The close-in reinforcement of reflected sound energy provided by the lowered ceiling panels now assures that hearing conditions for *live* speech are excellent throughout the reduced size auditorium.

Depending upon the program presented, the orchestral stage enclosure may or may not be employed. The hard enclosure that surrounds the orchestra or the chorus on the stage must, again, be movable to allow scenery to be employed for plays, musical comedy, or opera. In this auditorium, the ceiling of the movable stage enclosure is broken into two component parts, the forward portion, roughly 55 ft. x 10 ft., is flown in a manner similar to the orchestral enclosure ceiling panels of the 10,000 seat auditorium. The rear portion of the stage enclosure ceiling, however, is merely folded back against the rear wall of the stagehouse. The

side walls of the stage enclosure are easily moved out of the way on a curved track and stored upright against the rear wall of the stagehouse wings. The back wall of the stage enclosure is permanent; it is merely the rear wall of the stagehouse itself.

Reverberation time adjustable

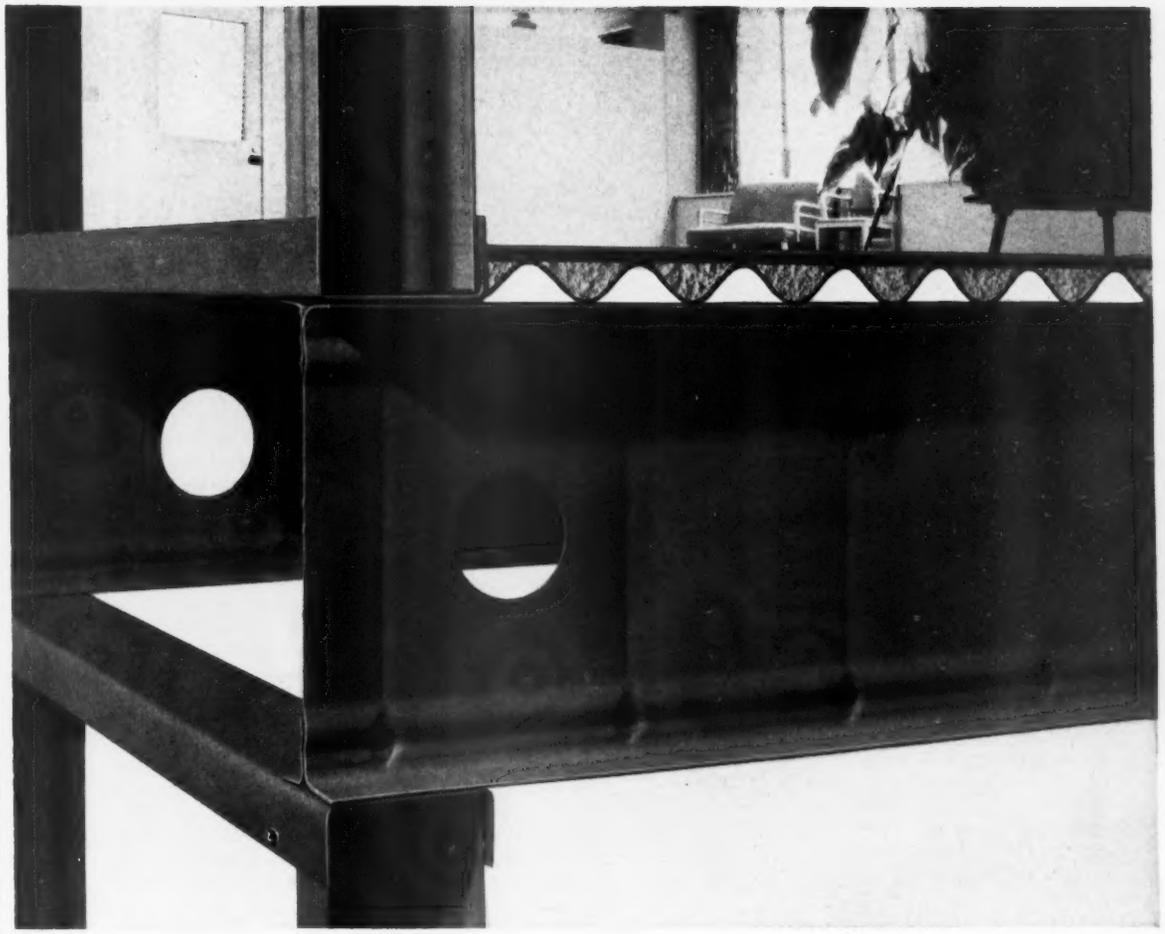
Adjustable sound-absorbing treatment in the upper side and rear walls of the auditorium is available to reduce the reverberation time of the hall to the optimum characteristics of speech activities. The ratio of the over-all volume of the hall to the seating area allows a greater than 1.8 second reverberation time to be acheved when the hall is used for orchestral music. Yet, even with a reduced size audience of only 1600, the reverberation time can be lowered by use of the adjustable sound-absorbing treatment to 1.2 seconds for lectures or dramatic productions.

Not strictly part of the adjustable acoustical treatment of the auditorium, the visual curtain can close off the upper rear balcony of the auditorium, effectively removing 1100 seats from the visual interior of the auditorium. The only acoustical requirement for this removable visual rear wall is that it be *either* sound-transparent *or* sound-absorbing. Sound energy that passes through this visual screen is absorbed by the upholstered seats behind and the adjustable sound-absorbing treatment on the rear wall.

We may expect the adjustable sound-absorbing treatment, together with the hinged ceiling of suspended ceiling panels, the movable stage enclosure, and most important of all, the basic shape of the auditorium, will assure that an excellent theater, concert hall, and opera house will be combined in one building. Supplementing the naturally excellent acoustics of this building for its various major uses, a central loudspeaker system, acoustically integrated with the room acoustics design, over the center of the proscenium arch will be employed to provide reinforcement for weaker voiced lecturers or to provide speech coverage for the entire 2700 seat auditorium. The acoustical conditions for each of the different uses of the auditorium may not be exactly optimum, but they will be very reasonably close.

If the conflicting requirements of the different uses of an auditorium are recognized in advance, detailed acoustical engineering can provide satisfactory and even very good results. Reducing the range of activities can allow a compromise more favorable to those remaining. The acoustical measures discussed in this article require detailed collaboration between the architect, theater consultant, acoustical engineer, structural engineer, lighting specialist, and others, if they are to make their proper contribution to the finished building.

Acknowledgment is given to the architects currently collaborating with the author's office on projects similar in some respects to the examples discussed in this article. These architects include A. G. Odell, Jr., and Associates of Charlotte, North Carolina; Hoyle Doran and Berry of Boston, Massachusetts; Biggs, Weir and Chandler and Overstreet Ware and Ware, Associated Architects in Jackson, Mississippi; and Lyles, Bissett, Carlisle and Wolff, Architects in Columbia, South Carolina. Theater consultant, George Izenour, of Yale University School of Drama, has been responsible for the design of the many mechanisms for adjustable devices similar to those discussed in this article.



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FLEXIBLE LIGHTING DESIGN FOR THE FLEXIBLE HALL

by Abe Feder*

If a multi-purpose hall or auditorium is to function successfully, it must have built into it a lighting system which will provide for the various and distinct lighting requirements without involving large amounts of complicated equipment. The author here presents solutions to this problem which, with the rising number of flexible halls, is becomingly increasingly general.

Until very recently less than a handful of cities in the country could provide ballet, musicals, drama, opera and concerts on a professional basis. Theaters are scarce, and there is a growing demand throughout the country for the living arts.

Similarly, available space for the industrial show or exhibition has trailed behind demand, and the city that loses these also loses all the prestige, the rentals, and the welcome flurry of traffic in their restaurants and hotels that always accompany these events.

The increasing demand for the living arts; the increasing number of industrial shows and exhibits, and their growing scale; and the increasing awareness on the part of civic groups of the value of tourism, have begun to coalesce. We begin to see new theaters, exhibit halls and hotels (with large ballrooms) to meet the various demands. But we see something else also: public halls are being planned on a year-round basis, and they are more flexible than anything we have had before. Even theaters, built only for the arts, are having to house not only ballet and orchestral concerts, but, by means of a series of stage and acoustical devices, the intimate drama as well. The exhibit hall can be turned into a theater; the ballroom can present a full-scale automobile show.

What we see is a new flexibility. This flexibility has happened not by accident, but by carefully detailed planning. One hall must now do the job of many.

The flexible room

The hall-auditorium-ballroom-arena cannot have appointments which are not easily disguised or concealed. The decor—wall finishes, draperies, treatment of doors—is permanent and cannot suffer a major change every time the room houses a new type of event. Thus the decor must suggest a "universal" atmosphere, offensive neither to the elegant ball on the one hand, nor to a utilitarian exhibition on the other. A certain amount of change can be accomplished with wall partitioning, but this affects only size and not atmosphere.

The key to flexibility is two-fold: a changing atmosphere for specific events, and provision for using the empty floor space in different ways. The room starts with four walls, a ceiling, and a floor; this is the free contained space in which people are *1* a seated audience, *2* strolling observers, or *3* active participants themselves. The problem is to change this space without cluttering and blocking sections of it from use. The answer is light, the one material which can fill space and give it texture, without obstructing its use. As the light changes, so does the texture of this inner space, and an atmosphere that can change at will is achieved. Substitute one lighting technique for another, and the result is a pattern of illumination which makes a ballroom possible one night, and a dining room possible the next.

Flexible lighting design

The flexible lighting design can change atmosphere and illumination patterns at will. It can turn a hall into an arena theater, or it can create a proscenium stage. In short it can make people feel that the hall was never anything else but the theater, or the ice-skating rink that it appears to be at any given time.

The flexible lighting design implies something else also: the same lighting equipment can be used for different events. The ceiling and walls cannot be loaded with a set of equipment for a circus, and a different set for a bridge tournament. The same equipment has to do multiple duty. The spotlight must be 360° adjustable, and the color filter changeable.

The cardinal element of a flexible lighting design is the *dimming system*. Ideally, the dimming system should be large enough to operate all the lighting equipment installed, any portable equipment brought in for highly specialized events, as well as equipment likely to be added to the installation in the future. This is to avoid rewiring so as to accommodate events not foreseen at the time of planning.

The question of numbers is a serious problem: how many lamps, how many fixtures, how many wires. In principle only the lamp which can do double duty is acceptable. The problem is both one of initial installation cost and one of operation. Every fixture must be re-lamped, cleaned, possibly repaired and painted. Every fixture represents so many man-hours of maintenance, so that every time the functions of two fixtures and two lamps can be combined into one fixture and one lamp, maintenance per unit is halved.

As regards initial cost, the fewer the units, the fewer the fixtures that have to be hung, and the fewer the wires that have to be brought to outlets. We can take this one step further: if electricity which is not being used by one fixture can be redirected to another fixture that is being used—and this is possible with a flexible dimming system—then the actual amount of power which must be provided can be cut.

The flexible lighting design is flexible in all its components, its lamps, its fixtures, and its dimming system. No flexible hall could be financed without such planning. No one could afford to install a lighting system in which each component could handle only one type of event. And it is doubtful whether any ceiling or wall could be made large enough to hold all the units thus required.

THE FLEXIBLE BALLROOM

The hotel ballroom today is a business enterprise, booking events of many types. Balls and banquets are only a part of the annual prospectus: just as important are business or professional conventions; industrial shows; exhibits of all sorts; and of course the industry-wide exhibitions in which the individual company buys space from the organizing group. In addition to these events, the hotel probably caters to a series of local affairs: communion breakfasts; various dinner and entertainment benefits, etc.

The ballroom is quite frankly in competition with the exhibit hall built especially for the industrial trades. Hotels now in the planning stage are putting a great deal of emphasis on the large amount of floor space available in the ballroom area. On what basis does the ballroom compete with the exhibit hall? It can offer more rooms, if the ballroom itself is not large enough. It can offer a sense of luxury. But it must likewise offer the kind of services the exhibit hall is geared for: efficient freight handling; well-planned traffic flow; uncluttered wall space; and of course a lighting design that can provide good general lighting, innumerable highlights for exhibit booths and wall displays, and a workable and well-equipped stage area for presentations. The exhibitor looks for a hall where his own overhead is kept to a minimum, a place to which he need bring little or no equipment, private or rented, and where manpower for handling and operating can be kept to a minimum.

The exhibit hall is bright, requiring many different light sources to handle the many different displays. The ballroom has a softer, warmer light, and cannot afford the clutter of spotlights or stage paraphernalia.

The Guildhall

The Guildhall, a new addition to the Ambassador West Hotel in Chicago, was opened in 1958. The lighting design is a good example of the flexible lighting that can turn a ballroom into an exhibit hall.

The main ballroom is approximately *16'* high and has a floor space of *108'* by *60'*. The focal point of the decor is a 10' diameter crystal chandelier suspended in the center of the ballroom. It provides a soft light, broken up by the reflecting crystals. To heighten the effect of the chandelier, indirect lighting was added by setting reflector bulbs inside the body and directed at the ceiling. Each has a warm or cool color filter, to vary color patterns for mood. Four smaller chandeliers, treated in the same manner, are hung from concave plaster domes recessed

Mr. Feder, a noted lighting consultant, has designed the lighting not only for numerous buildings, but also for a great many plays and musicals, including "My Fair Lady" and "Camelot."

into the four corners of the ceiling. All chandeliers are on dimmer control.

Around the central chandelier is an elliptical circle of 16 recessed spotlights employing 16—500W PAR64 lamps. Farther out, there is a larger elliptical circle of 40—500W PAR64 spotlights. Each of these spotlight fixtures can be rotated 360° horizontally and 45° vertically, so that any point on the floor or on each of the walls can be highlighted for displays. Since these spotlights are completely adjustable, they are used also for fashion shows, making it possible to create aisles of intense light in which the models walk. The PAR-type lamp, primarily designed for outdoor use, was brought indoors in this case for the sake of maintenance, a perennial problem for hotels. The PAR-type lamp is in every way more efficient than the more commonly used R-type (reflector) lamp. It is more compact, requiring less space; more hardy, requiring less delicate handling; more productive, providing more lumens per watt; more accurate in terms of its beam; and it has a longer life (about 2000 hours, or one to two years in terms of actual usage). The PAR64 size was chosen to get the most intense light possible. Since these adjustable spotlights are also on dimmer control, they are usually used at less than their full 500W capacity. The fixtures are recessed into the ceiling and further hidden from view by louvers, which prevent glare. Each fixture also has a specially designed reflector, to protect the light with a minimum of waste, and to help intensify and focus the light beam even more accurately.

Surrounding the two circles of adjustable spotlights is an elliptical fluorescent troffer, about 20" wide and 160' in circumference. This troffer is also on dimmer control, and can provide an even blanket of light throughout the entire ballroom. It is fluorescent in order to eliminate shadows and hot spots, and to ensure as soft a light from overhead as possible. This is important in relation to occupants, since light from above at a direct angle emphasizes unattractive facial features. The elliptical troffer can be used at varying intensities. At its brightest, an intensely-lighted exhibit or demonstration area is created while the perimeter of the room remains less intensely lighted, thus providing a natural contrast between the space used for presentation and the space occupied by the audience.

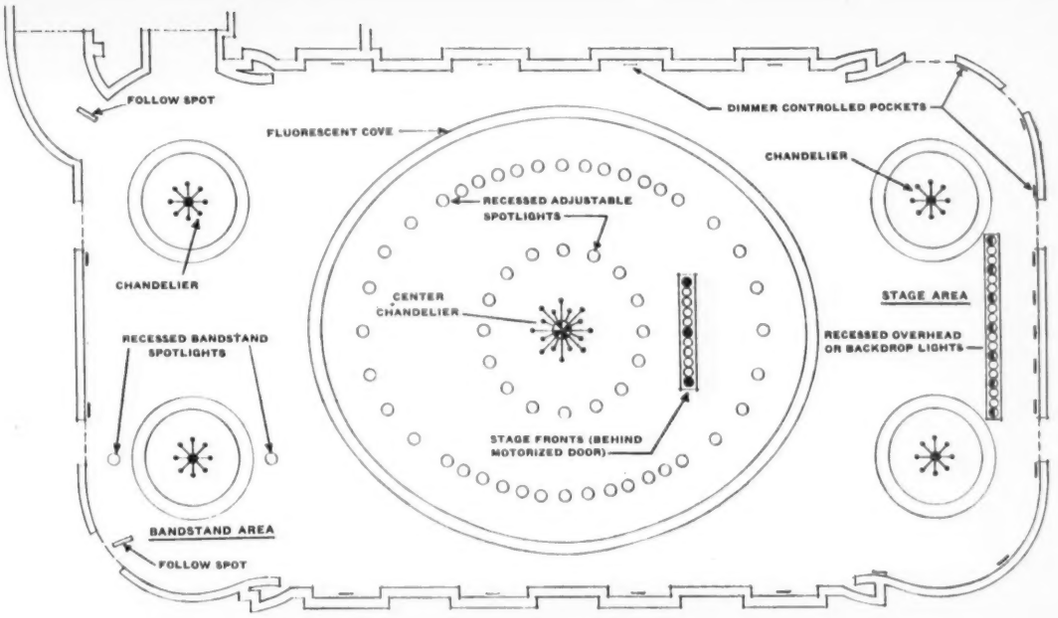
The fluorescent troffer employs warm-white deluxe lamps, which, among all fluorescent lamps, are the most flattering to skin tones. The troffer is shielded by a plastic designed especially for this project. It was felt that the plastic should reinforce the general sense of elegant decor, and match, as far as possible, the sparkle of the crystal chandeliers. Thus the plastic, based on a particular type of Murano glass, has a prism-effect, breaking up the light it sheds from within with a gentle scattering. Visually it retains the quality of glass.

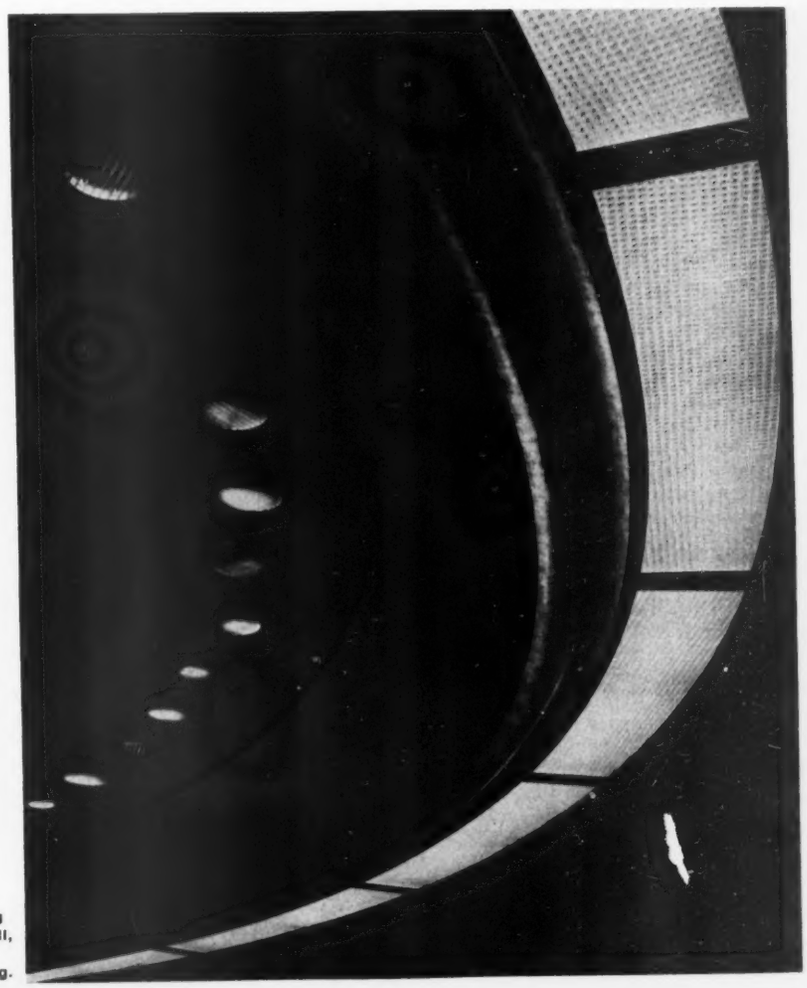
Above the area used as a bandstand, a smaller adjustable spotlight (PAR56, 300W) is recessed into the ceiling on either side of one of the corner chandeliers. These too are on dimmer control.

Stage

The area in front of one of the walls is used as a stage area, and a portable stage is brought in when a function calls for it. For this purpose, another battery of lights is used to create the various effects of dramatic lighting. The point of this additional battery was to avoid the need for theatrical equipment which is heavy, cumbersome and expensive, and

(Continued on page 22)





ABOVE: The Reflected Ceiling Plan, Main Ballroom, Guildhall, Ambassador West Hotel.
RIGHT: Detail of same ceiling.

LIGHTING THE FLEXIBLE HALL

(*Continued from page 21*)

employs lamps which are very short-lived.

Recessed into the ceiling, above the stage area, is a 20′ x 20″ troffer housing 8-PAR56 (300W) and 12-PAR64 (500W) reflector spotlights, each individually adjustable so that they can be targetted either towards the wall for glowing a backdrop, or towards the stage to provide backlighting for objects or performers. Recessed into the ceiling in front of the stage area is a troffer containing 12 adjustable incandescent units, 9 of them containing PAR64, 500W lamps, and 3 containing PAR56, 100W, low voltage lamps. Each has a pink or blue color filter for obtaining varying degrees of warm or cold lighting, and each has a louver for cutting glare. The troffer itself has motorized doors, which when not in use appear as part of the ceiling, operated from the dimmer switchboard. When the doors are opened, the troffer is lowered so that its units are focused onto the stage. This troffer provides the necessary front lighting and highlighting. The three low voltage lamps provide particularly narrow beams.

For cross-lighting, pockets are provided at either side of the stage floor area for plugging in portable pipes of PAR-type lamps. These side-pockets are wired directly to the dimmer switchboard, so that no temporary cable is necessary, and so that the side pipes of spotlights (tormentors, in stage jargon) are automatically on dimmer control.

All stage lighting is based on the need for an audience to see an object or person onstage in proper perspective and without distortion; thus that object must be seen in a light which comes not only from the front but from all directions. The Guildhall's uncomplicated stage lighting is based on this important consideration while avoiding the use of théatrical equipment.

Stage lighting requires one more feature: the follow-spot. This is located in a wall pocket, again behind sliding wall panels. When in use, the panels are opened.

Control

All lighting in the ballroom (except for the follow-spot) is on dimmer control. The dimmer switchboard is located in a room next to the stage area. It is hidden by doors which slide open when the switchboard is in use. When the doors are open, the audience sees an attractive mirror; but the switchboard operator can see through the mirror and has a complete view of the stage area.

The switchboard employs auto-transformer type dimmers. These were considered both practical and inexpensive. They will not burn out no matter how long lights are left burning. Special circuit-breakers were built into the board so that if a wire is inadvertently over-loaded, it is automatically cut off from the source of power and cannot burn. Because of space problems, the board itself was designed as compactly as possible. It has 18-6,600 watt auto-transformer dimmers, each controlled by an operating handle. The handles are mounted in three rows, six to a bank. Each bank of dimmer switches has a master switch controlling the entire bank. *One* electrician can run this compact board.

Seven of these switches are double-throw switches. A double-throw switch makes it possible for one dimmer to operate two completely different sets of light. It is important in design to see that no two sets of lights controlled by one dimmer ever have to be used on the same occasion. For example, one position of a switch might control the band-stand lights; the second position might control some of the stage lights which would never be used when the bandstand lights are on. Because of these double-throw switches, the number of dimmers necessary was cut by *one third*, and the size of the board could be cut accordingly. The use of double-throw switches also means that the actual power supplied to the ballroom could be correspondingly reduced. Since all lamps are activated solely through the dimmerboard, it is impossible to have them all burning at once. Maximum power provided supplies only 18—6.6KW dimmers, but the dimmers, as we have seen, control a third more in total wattage.

An extra receptacle was provided in the board for plugging in sound equipment when necessary. In addition, further convenience outlets, located in the side walls of the ballroom, are wired into the switchboard for dimmer control. These extra receptacles were provided should a dais be set up at the sides of the ballroom rather than in the stage area. Again, temporary cable is eliminated.

Everything hinges on dimmer control. This is what makes the lighting design flexible. From a single control point, any light can be turned on or off, dimmed, and colors blended. To preserve the atmosphere of the ballroom, the large fluorescent elliptical cove, highly functional since it provides the general lighting, looks like a ceiling design. All other units are recessed, to provide a visually quiet ceiling. The large, front-stage troffer is set behind motorized doors flush with the rest of the ceiling. These open only when the troffer is in use. In appearance, the Guildhall is a ballroom. In function, it is as efficiently lighted as any exhibit hall of its size.

In summary, the Guildhall's lighting is flexible enough to handle any type of event, and eliminates the need for hanging extra lights and equipment, and running temporary cable. In addition, predominant use of the PAR-type lamp eliminates the need for expensive lenses used *a* for theatrical spotlights and *b* for the type of lamp normally employed, which has a life of as little as 200 hours, or one tenth of the PAR-type lamp. The fixtures themselves have been designed for easy access for re-lamping and cleaning and were built to last the life of the hotel.

THE FLEXIBLE CIVIC CENTER

The new center in Tulsa, Oklahoma scheduled for opening in 1962-3, reflects the many different needs which must be incorporated. Provision is being made for concerts and theatrical presentations for an audience of about 1800; the Center will endeavor to attract all kinds of industrial events, and will be equipped accordingly; it will also provide for ice-skating, boxing, and other spectator sports; and it will accommodate local events, such as dances.

Obviously, the civic center competes with the ballroom, the exhibit hall, the theater, and the sports stadium in cities where all these services are available. But in cities where little or nothing of this nature exists, it tries to fill all these needs and also to bring into the city outside events and tourists.

Essentially, the lighting treats such halls as an arena, starting with the center core. Here lighting is provided from a ring of fixtures in the ceiling to provide an intensity of from 400-500 foot candles, the standard illumination level for boxing. If an arena stage is planned also, the same lighting, which of course is on dimmer control, is used. For arena presentation, however, two additions are made: one arc in each corner of the hall for front-lighting, and possibly narrow-beam lamps in the ring of lights overhead, to pick out the fine points of cutting through the even, general illumination with an intense, narrow spotlight.

Supplementary lighting

Further out from this ring is another, wider ring. This could provide lighting over a ramp set up below for fashion shows, roller-skating, and the like. In other words, specific rings of lights are provided in concentric circles for specific events, yet when one ring of lights is at high intensity, focusing attention on what is happening below, the other rings of lights are at a much lower intensity for non-obtrusive general lighting. All rings come into play for such functions as exhibitions. Again, all lighting must be controlled through a central dimming system, in order to preserve flexibility.

Depending on the hall itself and its seating arrangement, a special overhead lighting design is provided to separate this general area from the area where the functions are taking place. This forms part of the house lighting.

The same hall becomes a proscenium theater for either professional or non-professional events. The house lights dim slowly, and attention is drawn to the flood-lighted curtain in front of the hall, as in any theater. The two arc lights in the rear corners of the hall, at times assigned to arena lighting, now take over the function of arcs in any proscenium theater. Over the stage area, sets of borderlights are permanently hung on pipes which are part of the total rigging grid; the grid has other pipes for curtains, backdrops, and borders. At the wings are floor pockets, wired to the dimming system also, to accommodate side-lighting. Additional recessed front lighting is provided from the ceiling of the hall.

This time the dimming system, although double-throw switches are used, is too large to be located in a single area. The electrician-operator should be in the wings, if possible, but the dimmer bank itself takes up too much space. Therefore, a separate control console, small, compact and portable (if need be), is designed for the electrician to operate. It contains only the control handles, master switches, and any pre-set controls designed for the system. The dimmer bank, with its circuit breakers, safety devices and other delicate mechanisms, is located in a separate room above or below the stage area, but close enough to be reached by the electrician during a performance, should a circuit breaker snap or a dimmer fail. Any lighting system must be designed for easy accessibility to save time; central location of control to save number of electricians required; and simplicity of operation of console. All wall or floor pockets, fixtures, and work lights are controlled through this single console. A second panel means a second electrician.

The theatrical approach

The flexible hall is many things, but it is also a theater. It may not accommodate Broadway productions; it may not accommodate the Metropolitan Opera. But it does have provision for a proscenium or arena stage or both, and part of the trade which it is designed to attract is theatrical in nature. Industrial shows have borrowed more than a page from the theater, and are put over with much dramatic sophistication.

The theatrical approach requires above all a fairly extensive dimming system, extensive certainly as regards potential. Everything in the hall, in addition to the stage, should be on dimmer; if house lights cannot be dimmed before stage lights come up—there

no magic. This may mean more wiring than was allowed in the original budget. The potential part means wiring now for what may happen later. The dimmer board should have either spare dimmers, patches, or double-throw switches to provide for equipment that may be purchased later or introduced by certain productions. Unassigned pockets and "pigtails," wired back to the dimming system, should be provided at the locations where equipment, purchased later or brought in by others, naturally would be placed. Then this additional equipment is merely plugged in, without cable, and is immediately on dimmer with the remainder of the equipment.

The theatrical approach requires a stage that can be brilliantly lighted when required (this may mean more power allocated to the stage than to the rest of the hall); it requires provision for lighting from every angle; it requires some lamps that can cut through a general wash of light with powerful, narrow beams to emphasize some detail; and it requires at least one follow spot. This approach, so long as desired techniques are obtainable, can clearly dispense with the sheer multiplicity of theatrical equipment as we know it.

The future

The flexible hall requires new thinking in terms of equipment. Our current light sources impose a penalty on an already swollen construction and maintenance budget. Even though lamps with high efficiency, self-contained reflectors, long life, and high wattage are used, the sheer number necessary, however flexible the design, is excessive. Ballroom ceilings are from 16 to 25 feet high, and directing enough illumination to the floor with current light sources without having to install too large a number of bulbs, is a big challenge. The ceilings of civic centers and exhibit halls, however, are from 50 to 70 feet high, thus exacerbating the problem. We need larger lamps with higher efficiency and accuracy. More care must be taken with the glassware itself, with the reflector material, with the placement and size of filament. We must be able to replace two, three, or even four 500W PAR lamps, with one lamp that provides the same or higher illumination, and with considerably less wattage than the total of the lamps replaced.

The stage area in a civic center, exhibit hall, and the newer ballrooms is often 100 to 200 feet from the back. This means that where ceiling conditions force stage front lighting to the *rear* of the hall, theatrical spotlights, expensive to buy and to run, must be installed, since no commercial bulb alone can match the throw required. We need a new, hardy and efficient reflector bulb to do this job. There are other limitations in our existing light *sources*, but these two problems are the most pressing.

The *dimming system* is another matter. For one thing, unlike the major lamp companies, the dimmer companies are confined primarily to this one field, so that their research is concentrated here. Progress from the resistor-type dimmer to the auto-transformer, magnetic amplifier and controlled junction rectifiers has been revolutionary.

But the dimming system cannot function better than the lamp it controls, so that the lamp remains the key to any lighting design. When the lamp is improved, we will achieve better efficiency and better flexibility at every level.

Acknowledgement is given to the following who are currently collaborating with the author on the Guildhall project: Loebl, Schlossman and Bennett, architects; Everett Brown, interior designer.

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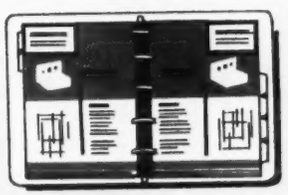

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LIGHTING WITH ELECTRO LUMINESCENCE

Electroluminescence is a phenomenon of physics which may in the next few years radically alter our thinking on illumination.

A visitor to the Westinghouse Lamp Division plant came away recently bearing a small frame enclosing a green glass covered panel about three inches across, with prongs in the back. This object in due course fell into the hands of this particular visitor's daughter, aged two, who plugged it into a wall outlet. To her delight, it lit up, and has remained lit, night and day, ever since. Furthermore, if things proceed as the manufacturer says they will, this little panel will remain alight, night and day, until mid-January 1963. It will generate no heat, and while its brightness will by that time have diminished by about 50%, there is no risk of it suddenly going out without warning, in the manner of its sister light sources. The phenomenon of physics making this possible is electroluminescence. To save printer's costs we shall follow common practice and call it EL.

Electroluminescence differs from incandescent lighting, which is a point source of light, and from fluorescent, which is a linear source in that EL is an *area* source, of uniform brightness. Incandescent lighting is based on a tungsten filament heated by electricity to the point where it gives off light. Fluorescent lighting stems from a gas discharge, which generates ultraviolet radiation, which in turn activates a phosphor applied to the lamp walls; some of the light comes from the arc, but most of it from the phosphor. EL, on the other hand, depends neither on heat nor on a gas discharge for its output; rather, its light is derived from two conductive plates enclosing a dielectric, to which a certain A.C. voltage at a certain frequency is applied. The dielectric, a few thousandths of an inch thick, consists of a powdered phosphor embedded in either an enamel or plastic. As energy—in this case electrical energy—is applied to the phosphor via the conductive plates, the phosphor emits light.

EL is one of several forms of luminescence, shown in *Table 1*. It is an application of solid state physics, in that a solid material, in this case the phosphor, is the source of light.

TABLE I

TYPE OF LUMINESCENCE	EXCITING SOURCE
Cathodoluminescence	Cathode rays
Chemiluminescence	Chemical action
Electroluminescence	Electrical field
Ionoluminescence	Ion beams
Photoluminescence	Visible light or ultraviolet
Roentgenoluminescence	x-rays
Radioluminescence	Alpha or Gamma rays
Triboluminescence	Mechanical action

The architectural lighting implications of EL have developed greatly since the discovery of the so-called Destriau effect by French Professor Georges Destriau in 1936. Destriau discovered that when an electric field strength of the order of 100,000 volts per centimeter occurs in a phosphor consisting of copper activated zinc sulfide, the phosphor particles become luminescent. The actual 1936 output was very small, about 0.001 foot-lamberts compared to that of a 75 watt incandescent bulb of about 100 foot-lamberts in a conventional fixture. The Destriau effect was in fact at first received with some skepticism, but after publication of an extensive account of Destriau's findings after World War II, research was begun with a view to commercial applications and development. Since that time, several major firms, including General Electric, RCA, Sylvania and Westinghouse, have come up with a marketable product, under various trade names.

Types of lamps

Two simple forms of EL lamps are shown in figures 1 and 2. Figure 1 shows two wire electrodes wound around a cylindrical core; space between the wires is then filled with a phosphor embedded plastic. In figure 2, two electrodes in the shape of combs are interlocked on a flat base, and the phosphor and plastic are applied over the whole surface. The trouble with these simple lamps is that they do not emit a uniform light, because the design of the lamp does not provide a uniform electrical field. Today, three basic types of EL lighting exist, all based on *sandwich panel construction*. The types differ in the material used for the base, to which the other layers are applied. The principle of sandwich construction is shown in figure 3. A protective layer acting as a base is coated with a conductive material (first electrode). The dielectric—generally plastic—in which the phosphor has been embedded, is then applied, and is covered with a thin, transparent conductive layer (second electrode). A second protective layer, which obviously must be transparent, is then applied, and the whole is sealed, chiefly to keep out moisture, which is anathema to all EL lamps.

The three types of EL lamps are *a* metal, *b* glass and *c* plastic based.

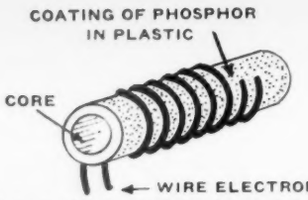

FIGURE 1. A simple electroluminescent lamp has electrodes wound on core, phosphor between wires.

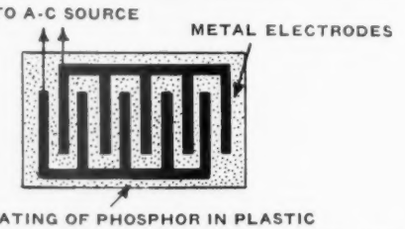

FIGURE 2. Another simple electroluminescent lamp, of different construction. This could be flat.

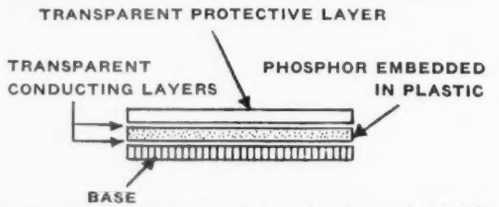

FIGURE 3. Still another cell has phosphor embedded in plastic, and is covered with a thin transparent protective layer.

Metal

Metal lamps are the most economical—initial cost is about 60% that of glass—and they also have the longest half-life: approximately 15,000 hours. They are by far the sturdiest of the three existing types of lamps. Experiments have been made involving fire from policemen's spatter guns, which failed to extinguish the light. They can be manufactured by punching, shaping or fabricating, and have an effective use as meter faces, dials and the like, both in and out of doors. While there is theoretically no limit to the surface area in which these lamps can be made, a practical limitation is imposed by dangers of warping due to differential expansion. Such a limit is said to be about 2 square feet per unit.

Glass

The danger of warping is eliminated by employing a glass base, which thus lends itself to use in much larger units. Glass, being a good insulator, does not involve enclosing the whole lamp in plastic, the way a metal lamp does. Some of the voltages used in EL lamps are such that very dangerous shocks can be experienced from metal lamps which are not well enough insulated. The basic principle of construction shown in figure 3 is put into practice as follows in the case of a glass base lamp: the glass receives a coat of transparent tin oxide, forming one electrode. A layer of plastic containing the phosphor is then sprayed on. Glass and plastic are heated to set the plastic, whereupon a layer of aluminum or other metal is vacuum deposited on the plastic layer. This becomes the second electrode, and is covered with a final protective layer. These lamps produce a higher brightness than the metal base lamps, and as a result find a more useful application as lamps. They have a half life of 5000 hours.

Plastic

Use of plastic as the base is a recent development, and has several advantages and disadvantages over the other two materials. For one thing, plastic used in the right thicknesses can bring about a lamp which is flexible, resulting, for example, in possible use of luminescent living room drapes. Also, the good insulating properties of plastics have led to applications in communications, including military ones, where it is important to sidetrack radio interference. A further advantage for the military is that plastic is hard to break, a common hazard in war. Plotting devices and instrument panels using EL are usually plastic. On the other hand, plastic lamps are by and large the least developed of the three, and consequently the most expensive, both in terms of initial cost and replacement. Half life, or the time it takes for a lamp to lose half its brightness, is only about one tenth that of the metal based lamps. Other bases still in an experimental stage include cloth and wire mesh.

Phosphors

Zinc sulfide is the most common phosphor, and at average voltages and frequencies produces, when combined with a copper activator, a green color. However, by varying the elements of the compound (cadmium for zinc, selenium for sulphur) and the activator (chlorine or manganese for copper) other colors become possible. Combining frequency changes with a mixed phosphor opens up all sorts of color possibilities. Take a dielectric consisting of a green and a red phosphor. One phosphor will be brighter at low frequencies, the other at higher, and each will predominate accordingly. At intermediate frequencies the colors will mix to produce white. A further ramification—and there are many—involves construction of *multi-layer* transparent cells, with infinite variations in color. It may be possible to sit in a room or a theatre and dial any kind of visual atmosphere one wishes.

Brightness and efficiency

Brightness increases with frequency and voltage, but efficiency does not. In order to achieve the most desirable efficiency, EL lamps would have to be operated at about half designated voltage and in the 500 to 1000 cycle range. In the laboratory, efficiencies as high as 14 lumens per watt of input have been achieved, but in practice 3 to 5 lumens per watt is a more realistic figure. This compares unfavorably with efficiencies of incandescent, fluorescent and mercury vapor lamps. The reverse is true as regards lamp life, (see table 2). Very high brightnesses have been reached, but only on laboratory work. At 20,000 cps and 600 volts, for instance, 2500 foot-lamberts were obtained. By way of comparison, a standard 40-watt fluorescent tube produces 1700 foot-lamberts. (A foot-lambert represents one lumen of light radiated per square foot of surface; a standard candle emits 12.5 lumens.) But while raising voltage has no direct effect on EL lamp life, raising frequency shortens it very drastically. Transformers are now on the market which will step up voltage as high as 600 volts from standard 115 to 120 voltage potentials. This from a commercial standpoint is a more sensible approach than supplying frequency-raising power transistors which will have the identical goal (i.e., increasing brightness) but will result in a shorter lamp life. Furthermore, above certain frequency levels, any additional frequency hike becomes subject to diminishing output returns.

TABLE 2
COMPARATIVE STUDY OF VARIOUS LIGHT SOURCES

	Efficiency (lumens/watt)	Life (hours)
Incandescent	16	750
Fluorescent	60	7500 (inc. 3 hrs/start)
Mercury	75	12,000
Electroluminescent	5	1500 (plastic) 5000 (glass) 15,000 (metal)

Discussion

Electroluminescence is significant for architectural illumination because:

1 It provides a virtually "flat" lamp. Since the need for ballasts, reflectors and similar equipment is eliminated above the level of the usual hung ceiling, slab to slab distances can be correspondingly reduced without reducing floor to ceiling height. Over a high rise building this would involve a sizable saving in dollars and cents, particularly as progress in forced air ventilation produces lower and lower duct depth requirements. Assuming an average height reduction of 9 inches per floor, an additional story could be added every 14 floors for the same overall height.

2 As soon as desired brightness levels are feasible economically, it will be possible to use EL panels as a sole source of room light by installing them on any (or all) surfaces of a room (see figure 4).

3 Variable colors and brightnesses are obtainable as a result of the relationship between voltage, frequency and phosphor composition. New research may develop a practicable phosphor *film* to replace current phosphor *powders*, resulting in application of direct current as a source of energy to complement prevalent A.C.

4 Research under way is investigating methods of combining heating and lighting in the form of "thermoelectric-electroluminescent" cells.

5 EL can be used as decoration by applying the conductive materials only to that part of the second electrode that is supposed to light. Portions where no conductive material exists remain dark after the lamp is switched on. A related application of this typical phenomenon is building signs.

6 Electroluminescence never dies, it only fades away. Consequently there is no risk of plunging spaces into darkness by a sudden burning out of a lamp.

7 There is no glare, and no heat is generated.

There are of course other applications of a less obviously architectural nature. It is possible that EL may replace the more bulky cathode ray tube used in television today. It also has its uses in outdoor signs; in conjunction with a photoconductor as a storage device for electronic computers; as "windshield radar"; or as a solid-state relay and switching device.

The chief deterrent to a major illuminating breakthrough for EL on the commercial market is its relatively low efficiency when compared to the other light sources. This is a problem in engineering which is being rigorously studied at the present time, and there is every reason to believe that a satisfactory solution is in prospect for the not too distant future.

The preceding article is based in large part on technical information kindly made available by the Lamp Division of Westinghouse Electric Corporation.

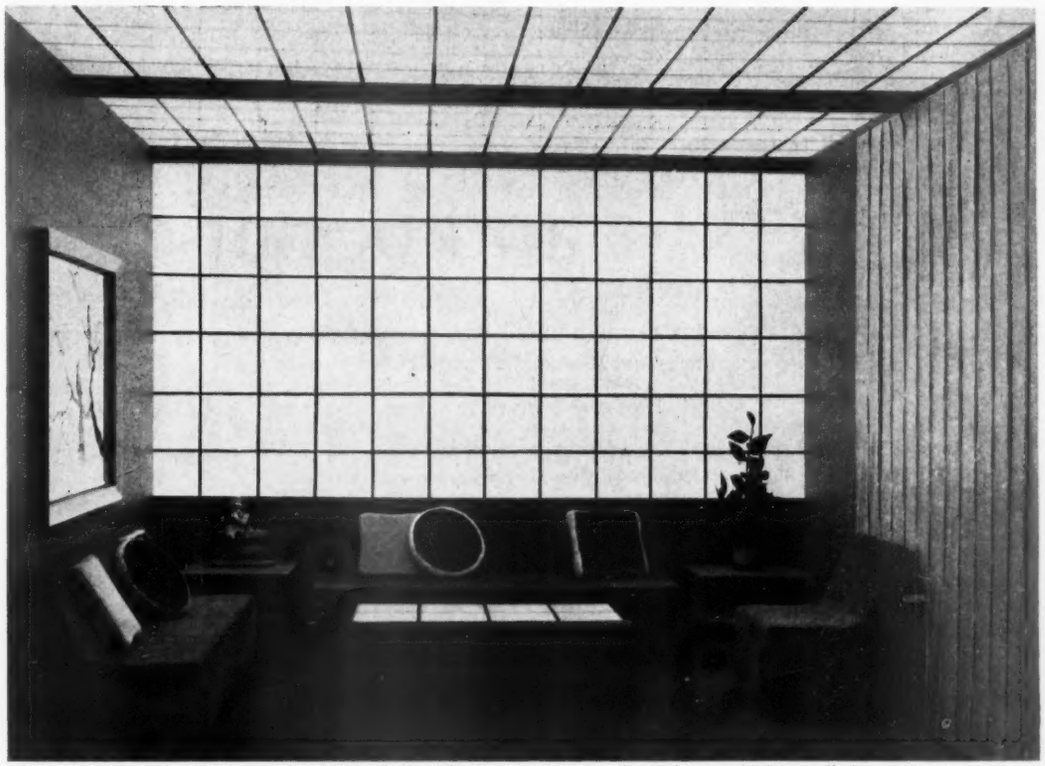

FIGURE 4. In the model room above, the windows in the rear have a phosphor coating sandwiched between two sheets of glass having an electrical conductive coating. By using a transparent phosphor, this glass permits the daylight to come through and the viewer to look out. At night, electricity would be applied and the transparent phosphors would emit light. Electroluminescent panels are also used to create a luminous ceiling, a coffee table with a top which lights, and an illuminated mural which is on the left wall.

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This month we treat two associations of professional interest in the areas of lighting and acoustics—The Illuminating Engineering Society and the Acoustical Society of America.

ILLUMINATING ENGINEERING SOCIETY

Founded in 1906 to provide a forum for all matters concerning illumination, the Illuminating Engineering Society centers its activities on the engineering aspects of lighting and the advancement of illuminating engineering.

Conferences/meetings

Every fall, IES holds its national technical conference, which is the highlight of the society's activities for the year. The conference brings together the profession's outstanding members for presentation and discussion of papers on the latest developments in lighting.

Publications

One of the best known IES publications is the *IES Lighting Handbook*, now in its third edition. Regarded by many as the "bible of lighting," the handbook of over 1,200 pages is a valuable reference to lighting information.

The journal *Illuminating Engineering* is the official monthly journal of the society.

Membership

IES membership on various levels is open to those who are interested in the objects of the society. Applications are subject to the approval of the society. For further information, contact: Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

ACOUSTICAL SOCIETY OF AMERICA

The Acoustical Society of America was organized in 1929 to increase and diffuse the knowledge of acoustics and to promote its practical applications.

Meetings/technical committees

The society conducts two regular three-day meetings a year for the presentation of papers on all aspects of acoustics. Visits to university and industrial laboratories are often features of the meetings.

There are ten technical committees in ASA which cover the following areas of professional acoustics: (1) architectural acoustics; (2) audio engineering and electroacoustics; (3) musical acoustics; (4) noise; (5) physical acoustics; (6) psychological and physicological acoustics; (7) shock and vibration; (8) sonic and ultrasonic engineering; (9) speech communication; and (10) underwater acoustics.

Publications

The *Journal of the Acoustical Society* is a monthly publication devoted to articles on research and engineering activity in acoustics.

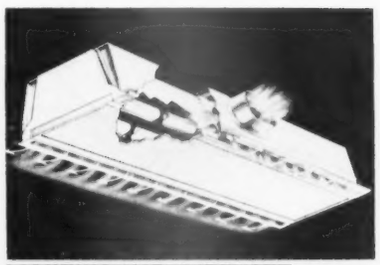
The society also publishes the bimonthly magazine *Noise Control*, containing information in the fields of noise and vibration control and architectural acoustics.

Membership

Any person interested in acoustics is eligible for election to membership in ASA. Membership is open on several levels, based on the applicant's professional status and his contributions to the advancement of acoustical science and technology. For further information, contact: The Acoustical Society of America, 335 East 45th St., New York 17, N. Y.

PRODUCTS, EQUIPMENT, MATERIALS

Report of recent developments by industry, based on data furnished by manufacturers. Inquiry cards for further information face pages 1 and 70.



LIGHTING/AIR DIFFUSER CEILING FIXTURE

MFR'S DESCRIPTION: new combination fixture—the *Ventro-Lux* with *Anemostat* air diffuser—provides light, heat, cooling and ventilation.

USES: ceiling illumination in offices, stores, banks, hospitals and schools.

SPECS/FEATURES: unit utilizes *Calux* lens which provides effective concealment of lamps and excellent diffusion of light. Manufacturer states unit is first troffer to be combined with a high capacity air diffuser. Air is directed along the ceiling for even distribution, eliminating possibility of drafts and uncomfortable temperature changes. The lighting and air diffuser units are designed together assuring a low silhouette, 6" or less. The two units are installed separately, eliminating conflicts in trades.

AIA FILE NOS. 30-J, 31-F-21

MFR: CURTIS ALLBRITE LIGHTING, INC.

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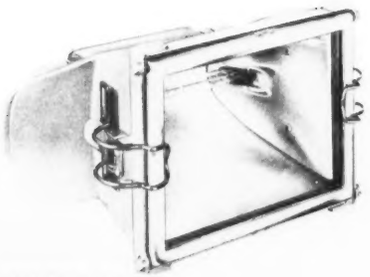

QUARTZ LAMP LIGHTING UNIT

MFR'S DESCRIPTION: Model *G-6000*, quartz lamp for indoor and outdoor applications.

USES: industrial, commercial and recreational facilities.

SPECS/FEATURES: unit gives the user exceptional light control and high operating efficiency as provided by the iodine cycle *Quartzline* 500 watt, 120 volt tubular incandescent lamp. Unit is reported to produce up to 19 per cent greater light with twice the lamp life of a conventional 500 watt lamp. Product maintains its 21 lumens per watt output throughout the 2,000 hour lamp-life rating. According to manufacturer, the weatherproof unit is more than a floodlight. While it performs many similar functions—the size differential and extremely sharp cut off in a rectangular beam spread—make it ideal for applications indoors and out. Lamp's housing is adjusted vertically by loosening hexagon bolts at either end. Housing swivels through vertical arc to permit positioning within the 180° vertical range. Unit's size is about the dimensions of a telephone and lamp resembles a pencil. Weight is about 3 pounds.

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MFR: APPLETON ELECTRIC CO.

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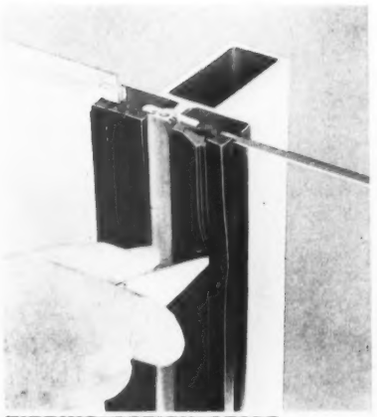

ZIPPING ACTION SEALS CURTAIN WALL

MFR'S DESCRIPTION: a low cost, factory fabricated system of aluminum mullions, panels, windows and adjustable perimeters. Uses an "H" shaped neoprene extrusion as weatherstrip and as connector of most structural components.

USES: schools, and commercial applications.

SPECS/FEATURES: manufacturer says speed of assembly, heat saving factors, ease of detailing and facility of installation are features of the new wall system. Item utilizes manual zipping action which hermetically secures infill components of a frame. Gasket transmits loads arising from glass and panel weight, and live loads imposed upon them, to the mullion itself. Manufacturer claims the new wall system is leak proof.

AIA FILE NO. 17-A

MFR: KAWNEER CO.

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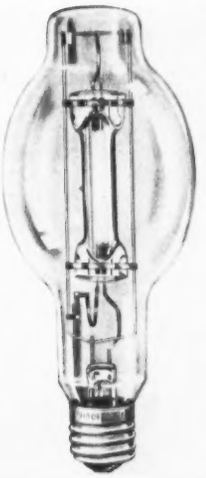
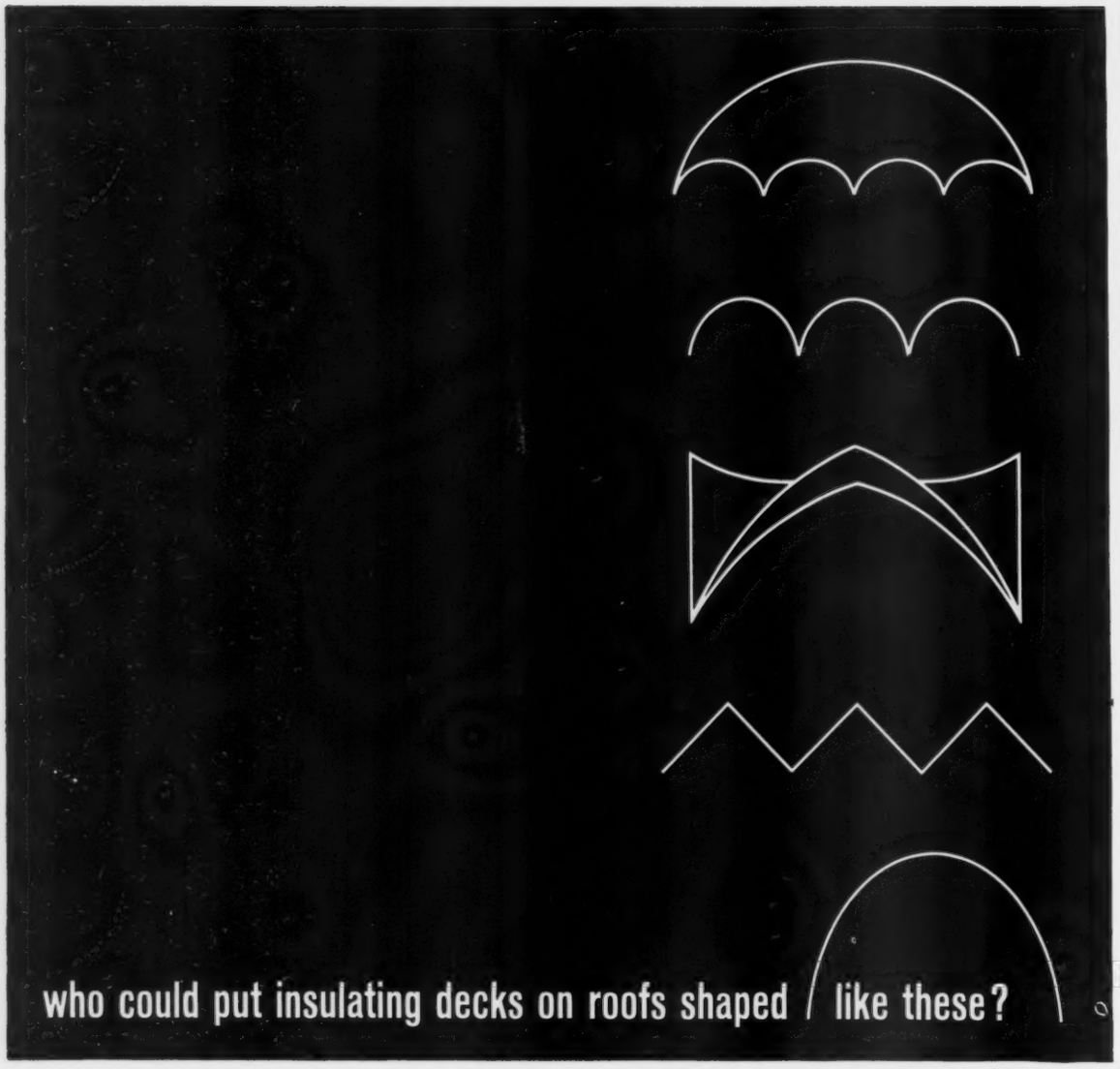


MERCURY VAPOR LAMPS WITH MORE LIFE AND LIGHT

MFR'S DESCRIPTION: improvement in mercury vapor lamps resulting in longer life and greater light output.

USES: industrial and commercial.

SPECS/FEATURES: new electrode in manufacturer's mercury vapor lamps reduces blackening of arc tube during life of the lamp. Improvement included in manufacturer's 100, 175, 250, 400, 425, 700 and 1000-watt mercury vapor lamps. Manufacturer says new arc tube provides user with up to 25 per cent additional light throughout the 12,000-hour useful life of lamp. Lamps with the new construction have a rating of over 40 per cent longer useful life compared to previous type lamps. Electrode in arc tube employs a new chemical formula, manufacturer explains. Material is embedded inside electrode, shielded from electric arc discharge. In this way it is protected from being eroded away. As a result, far less material is deposited on the quartz arc tube during burning and more of the light produced gets through the lamp and is usable. The



Who else but Certified Zonolite Roof Deck Applicators, using lightweight, contour-hugging Zonolite Vermiculite Concrete.

It insulates. It fire-protects. It's monolithic . . . doesn't require expansion joints. It works equally well over structural concrete, steel, or other supporting forms . . . whether the surfaces are curved, sloped or irregular.

As proof of the fact that Certified Zonolite Roof Deck Applicators know what they're doing, look at the job below. The trained Zonolite Roof Deck Applicator did it as a matter of course. (But wouldn't you hate to turn over a job like that to a bunch of hope-for-the-best operators?)

For complete information about Zonolite Vermiculite Concrete roof deck systems, mail the coupon today.

ZONOLITE COMPANY

135 S. La Salle St., Chicago 3, Illinois

Moisant International Airport, New Orleans, La.
Architect: Goldstein, Parham & Laubouisse, New Orleans, La.

Zonolite Company, Dept. AEN-51
135 S. LaSalle St., Chicago 3, Illinois

☐ Send new Catalog CA-56 on Zonolite Roof Deck Systems.

☐ Have a Zonolite Representative contact me on the following job:

Name _____ Title _____

Firm _____

Address _____

City _____ Zone ____ State _____

Circle 111 for further information

PRODUCTS, EQUIPMENT, MATERIALS

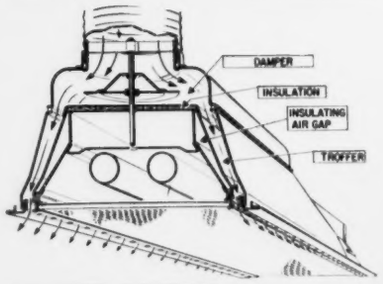
electrodes in a mercury lamp serve as terminals for the light-giving area. Mercury vapor lamps are made with a heavy duty outer bulb which will not break when spattered with water and will not craze or crack when exposed to industrial fumes that cause ordinary glass to deteriorate.

AIA FILE NO. 31-F-21

MFR: WESTINGHOUSE ELECTRIC CO.

Circle 203 for further information

LIGHTING



CLIMATE CONTROL IN CEILING LIGHT FIXTURE

MFR'S DESCRIPTION: fluorescent illuminating ceiling fixture providing temperature control.

USES: institutional and commercial.

SPECS/FEATURES: a new unit that provides light and both hot and cold air-conditioning from a single concealed ceiling fixture. A feature of the new line of equipment is the air passageway completely isolated from the troffer housing by insulation and an insulating air gap, reducing possible temperature variation affecting the light output of the unit. Air-handling capacity is from 0 to 200 cubic feet per minute (cfm) from a single 1'x4' or 2'x4' unit. Item depth is 4⅞" at the ends of the unit.

AIA FILE NO. 31-F-21

MFR: BENJAMIN DIV., THOMAS INDUSTRIES, INC.

Circle 204 for further information

OBLIQUELY DIRECTED LIGHT FOR QUOTATION BOARDS

MFR'S DESCRIPTION: use of incandescent and fluorescent lighting fixtures with various type mountings to direct light obliquely for illumination of quotation boards.

USES: brokerage offices and exchanges.

SPECS/FEATURES: manufacturer says quotation boards are illuminated with fixtures that are mounted flush with the ceiling but which direct their light obliquely so that it illuminates the vertical quotation boards.

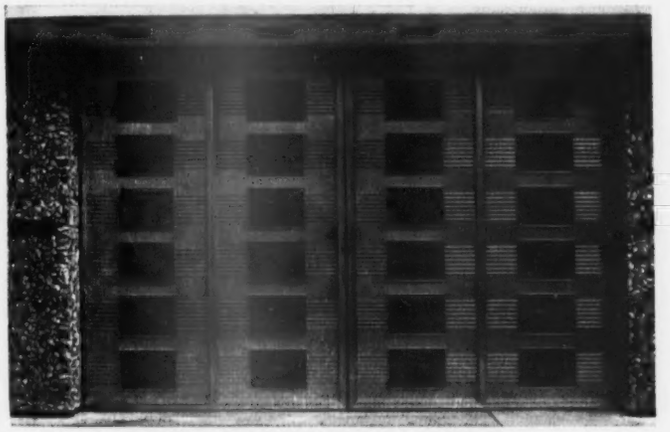
Circle 112 for further information about ANACONDA→

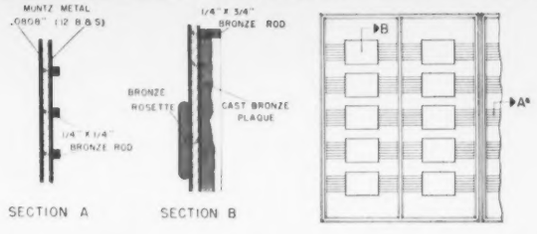
DOORS, UNLIMITED

—wide variety of colors among copper metals and easy fabrication offer endless design possibilities

These widely diverse doors illustrate the broad scope of design possibilities with copper metals — ranging from sheet copper, through various bronzes, to nickel silver. The colors range from the rich blue-green patina of copper to the warm white of the copper-nickel-zinc alloys. No other family of architectural metals gives the designer so much freedom in translating architectural ideas into reality.

▼ **Empire Savings Building & Loan Association,** Denver, Colorado. These Bronze sliding doors are of extruded Architectural Bronze and Muntz Metal sheet over a steel plate core. Decorative plaques are of cast Bronze. Fabricator's shop drawing below shows fastening details. ARCHITECTS: Raymond Harry Ervin & Associates, Denver. FABRICATOR: William G. Zimmerman Architectural Metals, Inc., Denver.





These are three of many new examples of distinctive architecture with Bronze shown in our 2nd Edition of "Architectural Metals by Anaconda." In its 64 pages are practical and detailed information on the available metals, their compositions, colors, forms, physical properties, application methods, suggested specifications, and fabricators' shop drawings. Write for your copy today. Address: Anaconda American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

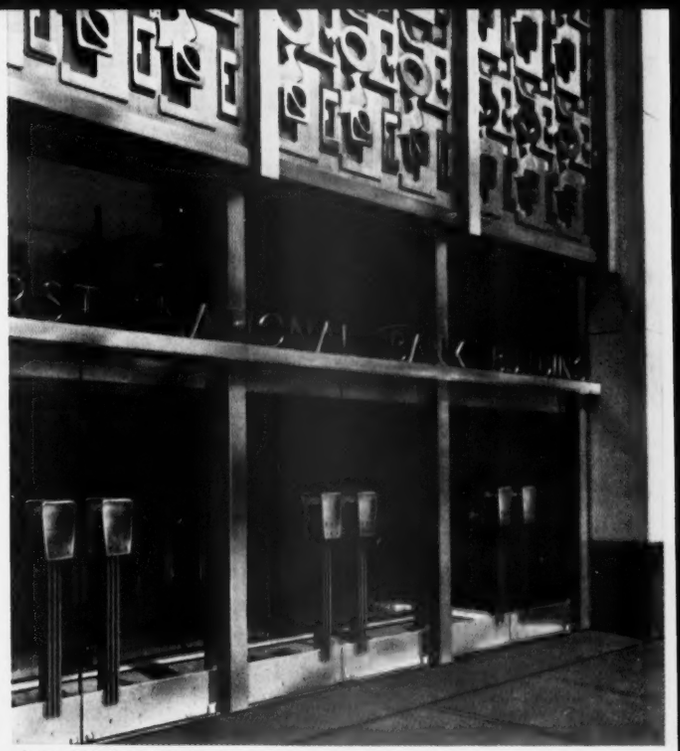
6112

BRONZE—the Architectural Metal of Distinction

ANACONDA®

ARCHITECTURAL METALS

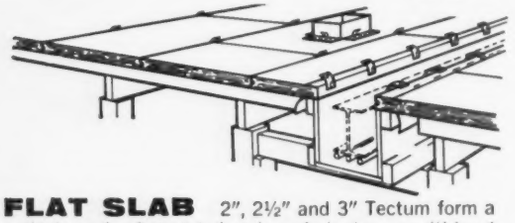
Anaconda American Brass Company



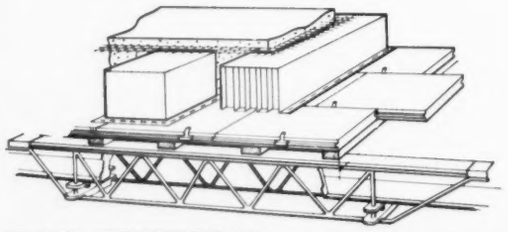
▲ **First National Bank,** Denver, Colorado. In this attractive entrance, Nickel Silver predominates, but with areas of Bronze to accent the warm, silver-white color of the copper-nickel-zinc alloy. The exterior is Nickel Silver, the vestibule doors and frames are Nickel Silver and Bronze. The grillage above the entrance consists of Nickel Silver Castings with both polished and matte-finish surfaces. ARCHITECT: Raymond Harry Ervin, Denver. FABRICATOR: William G. Zimmerman Architectural Metals, Inc., Denver.

▼ **Normandy Presbyterian Church,** Normandy, Mo. These beautiful doors are of wood with .064" sheet Copper facings and extruded Bronze trim. The Copper, bonded to the wood with contact cement, was chemically treated to produce the lovely patina. Symbolic sculpture was formed from sheet Copper and covered with drippings of Bronze and Brass welding rods. Handles and star are Bronze castings. ARCHITECTS: Eric W. Smith, Jr., and Robert Entzeroth, Clayton, Mo. SCULPTOR: Hillis Arnold, Kirkwood, Mo. FABRICATOR: Architectural Bronze Studio, Inc., St. Louis, Mo.

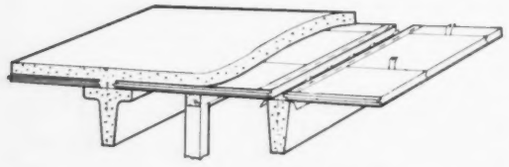
4 new ways to form concrete



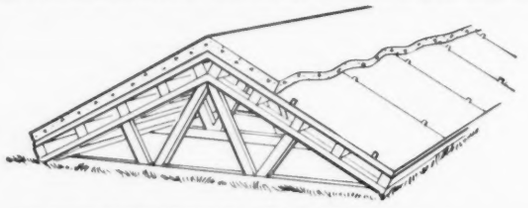
FLAT SLAB 2", 2½" and 3" Tectum form a solid base for flat slab forming of single or multi-level floors and ceilings. Tongue and groove joints, metal clips and natural bond with the concrete material assure positive support and installation in less time with uniform results. Tectum is shored until concrete cures. Tectum may be painted without materially affecting the acoustical value of the ceiling surface.



PAN SYSTEMS Tectum one and two-way pan systems utilize Tectum as a permanent forming material. Corrugated fiber pans are stapled to the Tectum decking which has tongue and groove edges on all four sides. Modular Tectum planks 2" x 30" x 96" are used for all two-way systems. Shoring members are positioned beneath each concrete joist. Reinforcing steel is laid between pans; steel mesh over the pans as illustrated. Tectum Form Plank for pan system construction has many advantages.



PRESTRESSED JOISTS Tectum has many applications on systems using prestressed concrete joists. With stirrups cast into the joists and with Tectum used as a forming material, the concrete slab ties directly into the structural system forming a tee-beam. Tectum form plank remains in place as a permanent acoustical ceiling and may be painted after moisture has drained from the slab. Economical wide span construction is possible in systems of this type.



PREFORMED SLABS The precasting of concrete slabs at the job site for folded plate and other roof deck sections can be economically and rapidly accomplished using Tectum form plank. Complete sections are cast over Tectum forms; form and slab are lifted from the shoring and allowed to cure at the job site. When ready for erection, the units are raised to the roof level and erected quickly and economically. This method saves time, material handling and eliminates conventional shoring expense.

Design Data

Tectum Form Plank

	FP200		FP250	
Concrete Slab Thickness	2" thru 4"	4" thru 8"	2" thru 4"	4" thru 8"
Max. Shoring Joist Spacing	24"	20"	28"	24"
Standard Form Plank Sizes (Covering Area)	22" x 48" thru 120" 30" x 48" thru 120"		22" x 48" thru 120" 30" x 48" thru 120"	
Modular Form Plank Size	2" x 30" x 96"		not available	
Noise Reduction Coefficient	.60-.70		.65-.75	

Note: 1" and 3" Form Plank also available

U-Values

AIR-TO-AIR

for Tectum Form Plank with sand and gravel concrete

Slab Thickness	Concrete Without Tectum	Concrete With Tectum	
		FP200 (2")	FP250 (2½")
3"	.980	.208	.174
4"	.910	.203	.172
6"	.785	.198	.167

Note: When lightweight concrete is used, the above values will be numerically lowered depending on the particular mix used.

Tectum®

Tectum Form Plank provides a permanent forming material with insulating and acoustical benefits for all types of construction. As a form, Tectum is structural, easily cut, can be shaped to the radii of many of the new curved shapes. Left in place, it becomes a permanent ceiling surface with an attractive acoustical texture for interior ceilings. The four methods illustrated represent the basic uses for this versatile material. Complete information on how to apply any of these methods will be sent on request.

Tectum CORPORATION

535 E. Broad Columbus 15, Ohio

Circle 113 for further information

Oblique lighting is achieved in the lenses of the luminaires. The lenses are concaved upward into the fixtures and have a multiplicity of prisms molded into their surfaces. This angles the light from the bulbs onto the upright quotation board. Manufacturer points out that applications must be design engineered for each specific job.

AIA FILE NO. 31-F-2

MFR: HOLOPHANE CO., INC.

Circle 205 for further information

ILLUMINATION FOR LIGHT FAILURE EMERGENCIES

MFR'S DESCRIPTION: battery operated emergency lamp. 115 volt, 60 cycles.

USES: emergency illumination.

SPECS/FEATURES: designated *Chargomatic 88*, item contains no manually operated switches or timers. Plugs into a standard 115 volt, 60 cycle outlet. Normal power maintains battery charge. Item also available with three-conductor cord and plug or condulet for permanent AC connection. All units are equipped with test switches. Item has two flood heads and can support a total of five lights in operation. Battery is a 6 volt, 105 Amp.-hour, lead acid, glass jar type and is equipped with visible hydrometer balls, so charge level is instantly known. Unit carries manufacturer's 5-year guarantee.

AIA FILE NO. 31-F-2

MFR: ELECTRIC CORD CO.

Circle 206 for further information

FLOODLIGHT LOUVER WITH TIGHT BEAM

MFR'S DESCRIPTION: floodlight louver designed to aim light in a tight beam.

USES: outdoor residential and commercial illumination.

SPECS/FEATURES: item is engineered for 45-degree cut-off in any direction to conceal lamp brightness from view. Prevents glare from "blinding" motorists or passers-by, and eliminates side and back spill-light. The louver fits in manufacturer's outdoor bullets using any standard *PAR-38* or *R-40* medium base reflector lamp. Standard color is camera black. Also available with amber, blue, green or red lenses.

AIA FILE NO. 31-F-22

MFR: STONCO ELECTRIC PRODUCTS CO.

Circle 207 for further information

IMPROVED DESIGN IN VAPORTIGHT LIGHTING

MFR'S DESCRIPTION: stronger, molded *Carrara* glass diffuser used in manufacturer's vaportight fixture.

USES: commercial and industrial.

SPECS/FEATURES: improved vapor and weathertight lighting fixture suited for shower rooms, locker rooms, loading platforms, wash rooms, etc. Available in either anodized cast aluminum or matte natural cast bronze with or without hinged cast protective guard. Supplied completely wired with cast aluminum junction box, gasket and mounting screws. Designed for use with two 60-watt lamps. Optional finishing collar conceals exposed outlet box when conduit cannot be recessed.

AIA FILE NO. 31-F-28

MFR: MCPHILBEN LIGHTING, INC.

Circle 208 for further information

DRY-CELL BATTERY HELPS CUT LAMP COSTS

MFR'S DESCRIPTION: emergency, automatic-operating lamp utilizing 25-watt PAR 36 sealed beam and a 9-volt dry-cell battery.

USES: industrial and institutional.

SPECS/FEATURES: costs have been cut in the buying and maintenance of emergency lamps with the replacement of the wet-cell battery by a dry-cell power source. Designed for use either horizontally or vertically, the lamp is packaged in an acid-resistant 20-gauge steel case. The automatic lamp is built for mounting on wall shelf or bracket. The emergency lamp provides about 3¼ hours of lighting with one lamp, and 1½ hours with two lamps. A second lamp is optional.

AIA FILE NO. 31-F-28

MFR: EXIDE INDUSTRIAL MARKETING DIV.

Circle 209 for further information

FLUORESCENT LAMPS WITH IMPROVED BALLASTS

MFR'S DESCRIPTION: quieter operation, more efficient heat dissipation and greater safety with new solid fill material in fluorescent lamp ballast.

USES: fluorescent lighting fixtures.

SPECS/FEATURES: basis of the new solid fill material is polyester. This development differs from other polyesters and other types of solid fill materials in that it retains a pliable consistency and will not become brittle with age or heat, manufacturer says. The design incorporates unitized ballast construction to insure a drip-free unit. The new polyester material was created as the result of combining a *Glycol* with an *Anhydride Acid* utilizing a peroxide to initiate a cross-linking or thermosetting of the resin.

AIA FILE NO. 31-F-2

MFR: ADVANCE TRANSFORMER CO.

Circle 210 for further information

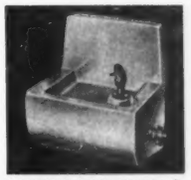
HI-LO COOLERS
Trim wall hung models with convenient child-height bubbler; single cooler available, too, in varying capacities. ▶

Specify the LEADERS in DESIGN and SERVICE

▲ "FLUSH-TO-WALL" COOLERS
HWF-Series coolers in many capacities; fit flush-to-wall to end cleaning cares;

When you specify HAWS, you are sure of getting the **best** fountain or cooler for any particular location. For over 50 years, HAWS has set the pace with better materials, fine design and superior workmanship. Why settle for less? See the complete array of HAWS products in the detailed catalog—yours for the asking. Write today.

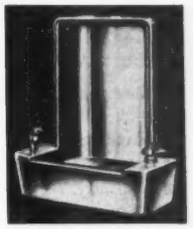
FIBERGLASS WALL FOUNTAIN ▲
Model 71, available in choice of colors at no extra cost.



VITREOUS WALL MODEL ▲
Model 61, in smooth vitreous china, features tasteful Haws styling.

STYLE LEADER
Model 1505, a Haws "trend-maker" in vitreous china, with cast wall bracket. ◀

▲ ENAMELED IRON
Model 7X, a rugged classic design in acid resisting enameled iron.



RECESSED BEAUTY ▲
Model 73 fits in the wall, smoothly contoured in stainless steel.

Since 1909 HAWS

products of HAWS DRINKING FAUCET CO.
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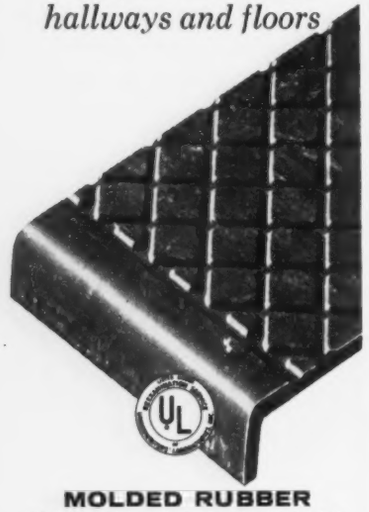
Circle 114 for further information

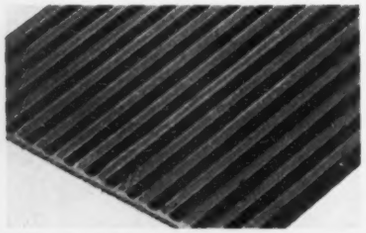
SPECIFY MELFLEX SAFELY

for stairs, landings hallways and floors



MOLDED RUBBER SAFETY STEP TREADS

Attractive, lasting covering for wood, metal, tile or concrete steps. Six marbleized colors (the color goes clear through) or plain black, square or curved nose, full 1/4" thick. Maximum sizes available: 24" deep by 72" wide. And Melflex Diamond Grip Rubber Safety Treads are *listed by Underwriters Laboratories* — you can specify Melflex with assurance.



RIBBED MEL-ISLE® RUNNERS

Heavy traffic areas need better protection, too. Tough Mel-Isle Runners have deep ribbed design for safer footing . . . wear-resisting rubber for longer life. Supplied in 1/8" or 3/16" thickness, standard 36" width, for varying service and design needs.

Also available: Matching Mel-Flor® smooth flooring in rolls or cut to specifications.

for lasting quality, Melflex pays

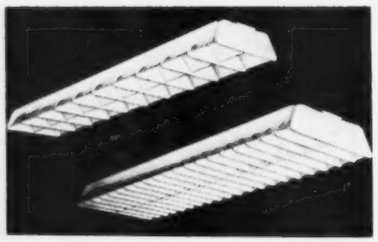
MELFLEX

PRODUCTS CO., INC.

410 S. Broadway Akron 8, Ohio

Circle 115 for further information

PRODUCTS, EQUIPMENT, MATERIALS



FLUORESCENT FIXTURE WITH REFRACTOR-LENS SIDES

MFR'S DESCRIPTION: unit with refractor-lens sides added to manufacturer's line of commercial fluorescent lighting fixtures.

USES: commercial ceiling illumination.

SPECS/FEATURES: low brightness plastic side panels have a louvered pattern and redirect light out of glare zone, according to manufacturer's specifications. Panels are clear polystyrene plastic 0.143" thick. Linear refractors are extruded on the inside to help eliminate dirt collection. Standard units available with 35x25 or 45x45 degree louvers in either two or four lamp construction.

AIA FILE NO. 31-F-21

MFR: BENJAMIN DIV., THOMAS INDUSTRIES, INC.

Circle 211 for further information

FLUORESCENT LAMP HAS TRANSPARENT SLEEVES

MFR'S DESCRIPTION: fluorescent lamps with protective, transparent sleeves to provide peak lighting in cold weather.

USES: industrial and commercial.

SPECS/FEATURES: company designated, *T10J* fluorescent lamps enclosed in glass envelopes to protect lamps from cold and wind. Jacketed lamps were developed to provide high levels of lighting the year round in applications where bare fluorescent lamps are exposed to low temperatures and wind. Item is used with weather-proof lampholders and low-temperature ballasts. Product is designed for use in poster panels and bulletins, electric signs, drive-in restaurants and other outdoor applications. Indoor uses include cold-storage plants, walk-in coolers and freezers.

AIA FILE NO. 31-F-21

MFR: GENERAL ELECTRIC CO.

Circle 212 for further information

SIDE SWITCHING FOR DIMMING CONTROL

MFR'S DESCRIPTION: dimming control *No. 655*, two-stage operation. Rated at 300-watts, 120 volts, AC.

USES: residential, institutional and commercial lighting controls.

SPECS/FEATURES: item fits into a standard gem box. Will replace any standard single-pole light switch, using the same two wires to connect. Device is for use with permanently installed incandescent fixtures up to 300-watts and offers two levels of illumination using ordinary single filament lamp bulbs. Toggle moves side-to-side and this action is said to eliminate the tendency to skip the Off position as is common with conventional up-down toggle switches. Hi position gives 100 per cent light and Lo gives 30 per cent.

AIA FILE NO. 31-D-3.

MFR: LEVITON MANUFACTURING CO.

Circle 213 for further information

NEW LIGHT EFFICIENCY IN FLUORESCENT LAMPS

MFR'S DESCRIPTION: four additional fluorescent lamps added to line introduced just a few months ago.

USES: commercial, industrial and institutional.

SPECS/FEATURES: four additional fluorescent lamps added to lamp line of manufacturer. Lamps provide 15 per cent more light than cool-white lamps and 36 per cent more than daylight-type lamps, manufacturer says. Lamps produce 3200 lumens, compared to 2800 lumens for ordinary 40-watt fluorescent lamps. Special green phosphors have been compounded which provide the unusual high efficiency in the lamps. They are delicately balanced by color-improving phosphors rich in red to provide a new shade of fluorescent light. The new color produces a cool, comfortable atmosphere, ideal for seeing tasks. Good rendition is obtained with the lamp on all colors as well as the complexion, the manufacturer claims. No change in ballasts, lampholders, starters, or wiring required. Now added to the line are two slimline lamps, the 48" and the 72", a 5' 90-watt lamp and a 40-watt instant-start lamp.

AIA FILE NO. 31-F-21

MFR: WESTINGHOUSE ELECTRIC CORP.

Circle 214 for further information

THREE NEW COLORS ADDED TO FLUORESCENT LAMP LINE

MFR'S DESCRIPTION: three new colors designed for greater light output and lower cost of light than equivalent colors of other 40-watt lamps, according to manufacturer.

USES: residential, commercial and industrial.

SPECS/FEATURES: three additional shades of white 40-watt fluorescent lamps expand manufacturer's present line to six shades of white. Lamps can be used either in "preheat" or "rapid start" circuits. Superior lighting qualities are expected because of the addition of anodes to the electrode mounts, the use of newer and more efficient phosphors, and the introduction of an improved gas mixture at controlled pressure. The three new colors carry a list price of about $1.50.

AIA FILE NO. 31-F-21

MFR: GENERAL ELECTRIC CO.

Circle 215 for further information

SHORT-ARC MERCURY LAMP OPERATES ON DC

MFR'S DESCRIPTION: designated type *SAH-250B*, the short-arc mercury lamp is rated at 250 watts at 42.5 volts DC, with average life of 250 hours.

USES: industrial, commercial and marine applications.

SPECS/FEATURES: short-arc mercury lamp provides a high-intensity point source of light. No forced ventilation or maintenance required. Brightness of the arc is measured at 250 candles per square millimeter, and the light produced by a new lamp is 10,000 lumens. Designed for use in comparators, polariscopes, interferometers, polarimeters and a variety of optical inspection devices. In projection service, such as ticker-tape projection, television rear-screen projection, and for microfilm reading, they improve the projected image, manufacturer says. Aids photo printing by projection from microfilm. Marine uses include signaling beacons and navigational searchlights. List price is $80.

AIA FILE NO. 31-F-21

MFR: WESTINGHOUSE ELECTRIC CORP.

Circle 216 for further information

VENTILATING SLOT COOLS BALLAST

MFR'S DESCRIPTION: fluorescent illuminating fixture designed to cool ballasts automatically.

USES: commercial and industrial illumination.

SPECS/FEATURES: air space provided by an embossment in the end of each reflector separates the channel from the reflector. Cool air circulating through this space ventilates the entire fixture so that both tubes and ballasts operate at lower temperatures. Increased life of these components means fewer replacements, less maintenance and dark-time, states manufacturer.

AIA FILE NO. 31-F-21

MFR: WHEELER REFLECTOR CO.

Circle 217 for further information

RADIO NOISE-FREE LIGHTING EQUIPMENT

MFR'S DESCRIPTION: fluorescent lighting fixtures specifically designed to eliminate radio interference.

USES: communication centers, and similar installations.

SPECS/FEATURES: equipment suppresses both conducted and radiated interference normally developed by unshielded and unfiltered fluorescent lighting sytems. Radiated interference is eliminated, company says, by using a completely shielded diffusing lens to which a transparent layer of pure metal is permanently bonded. Edges of the lens are provided with a gold-plated border which makes complete contact with the steel housing through an intermediate gasket of compressible metallic braiding. This prevents the interference generated by fluorescent lamps from being radiated into the surrounding area when the housing is properly grounded electrically.

AIA FILE NO. 31-F-29

MFR: ENDER-MONARCH CORP., DIV. OF ACOUSTICA ASSOCIATES, INC.

Circle 218 for further information

FLUORESCENT BALLAST LINE WITH NO INDIVIDUAL FUSING

MFR'S DESCRIPTION: new fluorescent ballast line designed to prevent critical temperatures and leakage.

USES: indoor fluorescent illumination.

SPECS/FEATURES: designed to eliminate need for individual ballast fusing. Available for indoor commercial and industrial applications. Designated the *Bonus Line*, the ballasts feature two new developments. One is a non-resetting protector which de-energizes the ballast before it reaches critical temperatures at end of life that may cause the ballast filling compound to soften. The other development is an improved capacitor with a new thermal link designed

Another fine specification for

PLASTER-WELD®

Luxurious 30 story

IMPERIAL HOUSE

New York's largest post-war apartment building

Here, at Imperial House, Emery Roth & Sons specified Plaster-Weld to bond finish plaster over all exposed concrete construction-slab ceilings, columns and beams.

After Plaster-Weld was sprayed on concrete, and had dried to a flexible film, plastering began, with Plaster-Weld creating a permanent bond between plaster and concrete. By eliminating rubbing and grinding of exposed concrete, Plaster-Weld helped provide a deluxe plaster finish at extremely low cost.

In case you haven't heard, Plaster-Weld is the amazingly versatile job-proven liquid bonding agent which bonds plaster to concrete . . . or any sound surface . . . for as little as 2c per square foot.

For complete technical information, see Sweet's, or write us direct. Address Box 5938-Z, Larsen Products Corporation, Bethesda 14, Md.

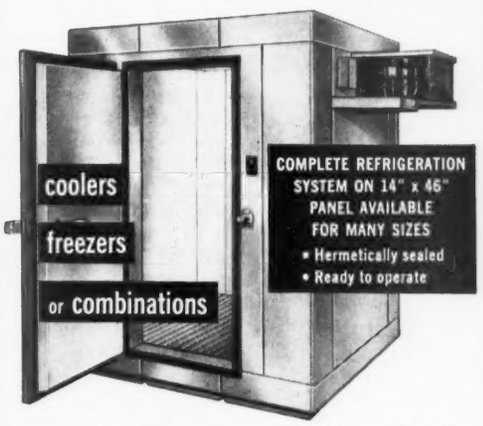
LARSEN PRODUCTS CORPORATION

LARSEN . . . FIRST . . . WITH THE FINEST IN BONDING AGENTS

Circle 116 for further information

Bally **walk-ins**

Aluminum or steel sectional construction



Sanitary! Strong! Efficient! You can assemble any size cooler, freezer or combination in any shape from standard sections. Add sections to increase size as your requirements grow. Easy to disassemble for relocation.

ARCHITECTS: see 8 pages of engineering data in Sect. 26/A of Sweet's Catalog.

Bally Case and Cooler, Inc., Bally, Pa.

Get details—Write Dept. AN-5 for FREE book

Circle 117 for further information

SEND FOR THIS FACT FILE ON CORBIN LETTER BOXES

See How Corbin Simplifies Installation Problems

Let Corbin reduce your work on plans for mail handling facilities. Complete plans and elevations for letter box requirements supplied without cost or obligation. Corbin cast bronze letter boxes are used throughout the world in impressive commercial and institutional buildings. Write Dept. D5.

CORBIN WOOD PRODUCTS DIVISION

THE AMERICAN HARDWARE CORPORATION

NEW BRITAIN, CONNECTICUT

Circle 118 for further information

to overcome capacitor rupture and leakage which may occur at end of life. In addition, a bushing assembly seals against capacitor dielectric seepage and contributes to longer ballast life. Items are dimensionally, thermally and electrically interchangeable with manufacturer's standard ballasts of same ratings.
AIA FILE NO. 31-D-1
MFR: GENERAL ELECTRIC CO.
Circle 219 for further information

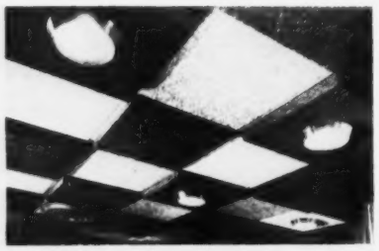
DECORATIVE VINYL LAMINATED DIFFUSERS

MFR'S DESCRIPTION: series of 16 standard patterns in formed 23⅝" x 23⅝" diffusers or flat panels. All diffusers consist of laminated sheets of ultraviolet stabilized, high-impact rigid vinyl.
USES: residential or commercial application.
SPECS/FEATURES: diffusers have laminated metallic fibers, sequins, natural foliage and other decorative designs, between sheets of vinyl in a series of 16 standard patterns. In addition to these, there is also available a series of additional designs in flat sheets of luminous wall, ceiling or special lighting applications. All of the diffuser designs are available in both formed and flat panels. Some formed designs are offered in a choice of square or circle insets. According to manufacturer, a fabric surface texture gives these diffusers a whiter, more brilliant appearance, lighted or unlit. The diffusers are designed for use from individual diffusers in fixtures, to small ceilings in homes, to extensive institutional or commercial installations.
AIA FILE NO. 31-F-23.
MFR: POLYPLASTEX UNITED, INC.
Circle 220 for further information

ACOUSTICAL CEILINGS

MINERAL TILE ACOUSTICAL CEILINGS

MFR'S DESCRIPTION: two additions to company's line of fissured acoustical tile.
USES: commercial interiors.
SPECS/FEATURES: model designated *"db"*, is made with foil backing and helps control sound transmission between rooms divided by ceiling high partitions. Model designed to help retard sound traveling through the ceiling and over partitions. Used with company's concealed suspension system, it provides an average sound transmission attenuation of 45.5 decibels. Second item, *"90"*, has light reflection of 86 per cent and manufacturer says can be painted several times without noticeable sound-absorption loss. Square-edge sections are kerfed to help obscure the joint between tiles. In use with company's concealed suspension system, item offers a 1½ hour fire rated bar joist concrete floor or roof and ceiling construction.
AIA FILE NO. 39-B
MFR: UNITED STATES GYPSUM CO.
Circle 221 for further information



CEILING TILES WITH ASSORTED THICKNESSES

MFR'S DESCRIPTION: acoustical ceiling tiles in thickness of 1" to 3" with a choice of 23 colors.
USES: commercial and institutional.
SPECS/FEATURES: up to five colors are available in each order and any combination of thicknesses may be obtained. Custom ceilings may be designed in many different varieties of effects. Ceiling elements are rabbeted to fit all standard suspension systems and require little space above the system for installation. Standard tiles sizes range from 16"x16" to 24"x48" and 30"x30". There is an assortment of sizes ranging from minimum to maximum in thickness, width and length.
AIA FILE NO. 39-B.
MFR: TECTUM CORP.
Circle 222 for further information

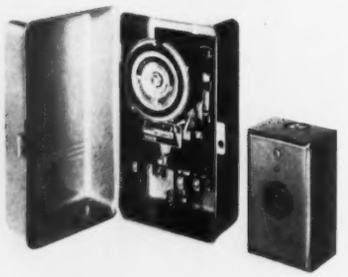
NEW PATTERNS FOR CEILING TILEBOARDS

MFR'S DESCRIPTION: two new tiles in ½" thickness, size 12"x12", with coated bevels.
USES: commercial and residential ceilings.
SPECS/FEATURES: one pattern is a perforated, decorative tile that combines sound-absorptive with a design of interlocking grey circles overprinted on a white background. Second pattern is a decorative tileboard with pattern achieved by an intermingling of gold and gray lines over a white background. Tiles have tongue-and-groove joint for application with either staples or nails. Items are cleanable with a damp cloth or a mild soap and water solution.
AIA FILE NO. 39-B.
MFR: INSULITE
Circle 223 for further information

ACOUSTICAL CEILING TILE WITH VINYL-PLASTIC COAT

MFR'S DESCRIPTION: acoustical ceiling tile with vinyl-plastic surface, both textured and smooth.
USES: commercial and residential.
SPECS/FEATURES: both tiles are white in color and company says highly light reflective. Both patterns designed to be used on the same ceiling. Vinyl-plastic surface helps cleaning. Items available in two sizes: 12"x12" with beveled-butt or tongue-and-groove edge, and 12"x24" with tongue-and-groove edge. Latter is scored to make it appear 12"x12".
AIA FILE NO. 39-B
MFR: UNITED STATES GYPSUM CO.
Circle 224 for further information

ELECTRICAL



TIME CONTROL SWITCHING WITH SENSITIVITY TO LIGHT

MFR'S DESCRIPTION: time switch with combination mechanical switching and a sensitivity to light.
USES: illumination.
SPECS/FEATURES: combining time switch and light sensitive controls for the automatic On/Off control of lighting. Provides flexibility over straight mechanical or photo electric control. With this control, lighting comes on automatically as needed, regardless of the season. It goes Off, automatically when no longer desired, at any pre-set hour. The automatic Off switching means lights do not wait until dawn before they go off, as with photo electric controls. Light conditions must remain constant for 30 seconds before the light-sensitive switch operates. A passing cloud causing momentary darkness will not affect the switch. Special wiring to the cell, mounted outside permits interior mounting of the time switch.
AIA FILE NO. 31-F-29
MFR: TORK TIME CONTROLS, INC.
Circle 225 for further information

PLASTIC WALL PLATES IN VARIOUS MODELS

MFR'S DESCRIPTION: line of smooth surface, plastic wall plates.
USES: residential and commercial lighting.
SPECS/FEATURES: line of plastic wall plates in white, ivory and brown colors. Devices include: one, two, three, and four-gang switch plates, one and two-gang duplex receptacle plates, two-gang combination switch and receptacle plate, single receptacle plate, telephone plate and blank plate.
AIA FILE NO. 31-D-26
MFR: BRYANT ELECTRIC CO.
Circle 226 for further information

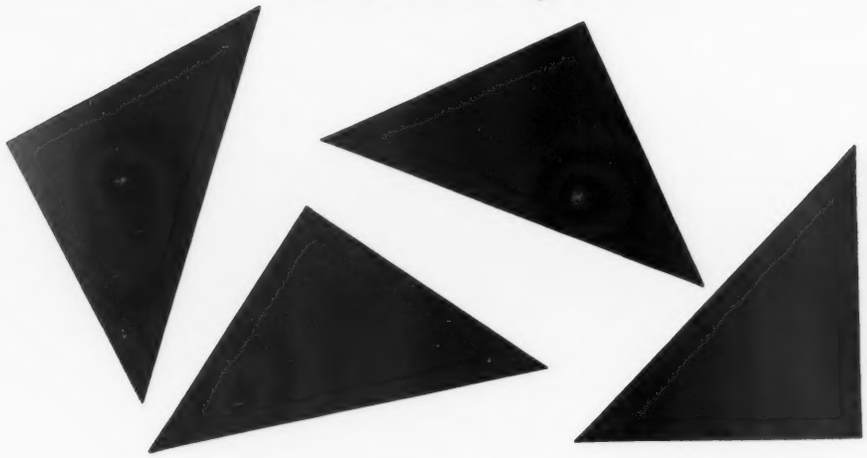
SMALLER CIRCUIT BREAKER REDUCES SIZE BY ONE-THIRD

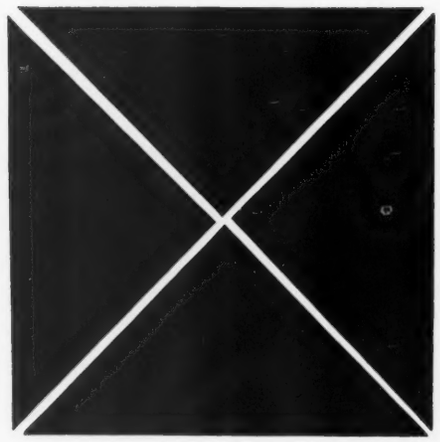
MFR'S DESCRIPTION: two- and three-pole circuit breaker with current ratings of 125 through 800 amperes, for 600 volts ac and 250 volts dc.
USES: industrial and commercial applications.
SPECS/FEATURES: breaker, designated KM frame, is smaller than its LM predecessor by one frame size. Provides exactly the same electrical features and rating of LM units. Depth and height have been reduced, width remains the same. Smaller size of the new circuit breakers permits more units to be mounted in a standard switchboard, while distribution and power panelboards can be built shallower. Features on the new unit include enclosed terminals and front adjustable instantaneous trips. Pressure wire connectors are available for front connection of the breakers in panelboards, individual enclosures and control cabinets. Rear connecting studs and plug-in connector assemblies are available for switchboard mounting. Special features such as shunt trips, auxiliary and alarm switches and undervoltage trip devices can be furnished for internal mounting.
AIA FILE NO. 31-D-4
MFR: I-T-E CIRCUIT BREAKER CO.
Circle 227 for further information

20-AMP RECEPTACLE REJECTS 15-AMP PLUGS

MFR'S DESCRIPTION: 20 ampere, 125 volt, two-pole, three-wire grounding receptacle.
USES: commercial and industrial applications.
SPECS/FEATURES: configuration of the receptacle face prevents insertion of parallel blade plugs. Makes it impossible to plug ordinary portable electrical equipment or appliances into 20-amp circuits where this receptacle is used. Receptacle's U-shaped contacts and terminals feature one-piece construction of 1/32" bronze. This is mounted on the strap by a brass rivet, headed on both sides. One-piece construction eliminates the possibility of loose joints, parts turning in the grounding path. Receptacle offered in brown or ivory and supplied for side wiring and

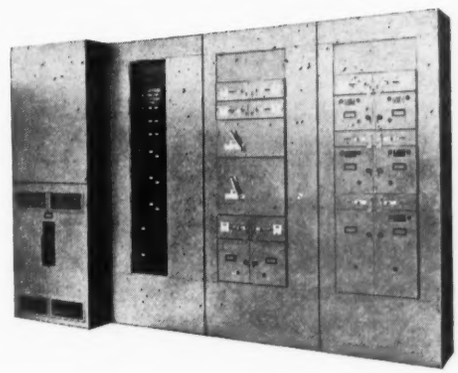
make it compact





make it Westinghouse Series 1 Switchboards

Series 1 Switchboards by Westinghouse offer the most compact power control and distribution centers available. All components are front-accessible permitting placement against wall areas. Service sections with DB-type air circuit breakers or pressure-type fusible switches through 2000 amperes are only 25″ to 29″ deep. Service and distribution sections with AB-type circuit breakers through 800 amperes and FDP-type fusible switches through 600 amperes are only 15″ deep. Your Westinghouse wholesaler has complete information. *You can be sure . . . if it's*



Westinghouse

J-93556

Circle 119 for further information

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FIAT

FIAT METAL MANUFACTURING CO

Enclosures "packaged showers" LEADS THE WAY!

* FIRST IN FEATURES
* FIRST IN PERFORMANCE
* FIRST-ON-THE-JOB
  FROM FIVE STRATEGIC PLANT LOCATIONS

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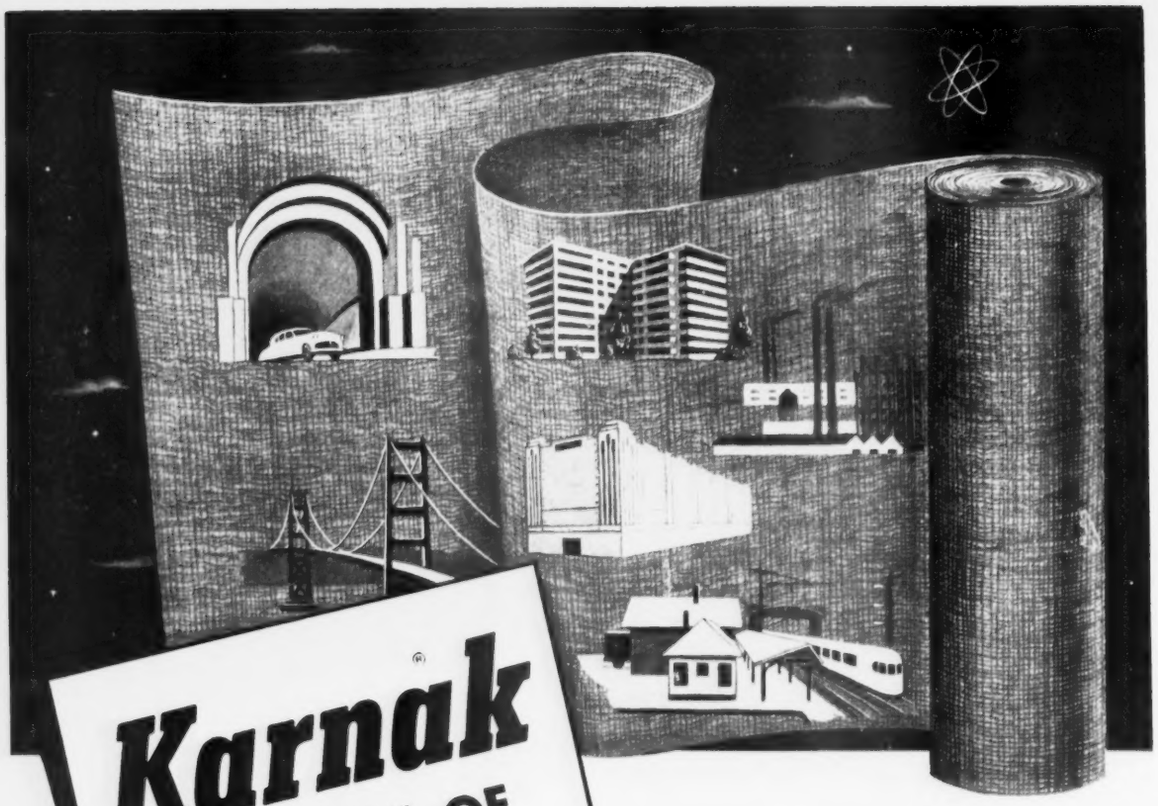


Karnak

"SYSTEM" OF MEMBRANE WATERPROOFING

PROTECTS ALL CONSTRUCTION

THE HIGH quality of KARNAK Waterproofing started with materials conforming to specifications of the American Society of Testing Materials. Through production ingenuity and constant laboratory control, KARNAK developed these materials into the superior waterproofing "system" for long-life protection of any structure.

The KARNAK Waterproofing "System" is based on the use of a carefully-refined and ductile asphalt, reinforced and held in place by a strong interlocking cotton fabric membrane. Only through the use of cotton fabric membrane can the exact thickness of supporting asphalt be secured —and this is the true test of waterproofing protection!

Distinguishing features of KARNAK Waterproofing Fabric are its special open-mesh construction and the method of saturating it that keeps the meshes open. The asphalt material cannot crack up!

KARNAK Waterproofing Fabric unrolls evenly, without distortion . . . can be applied smoothly, wrinkle-free. Each roll is individually packaged in sturdy corrugated cartons, stays in perfect shape until used . . . and can be used right down to the last inch!

FREE! Write for your copy of the KARNAK SPECIFICATION BOOK. It outlines in detail quantities and method of application of the Karnak "System" of Membrane Waterproofing. Please address . . .

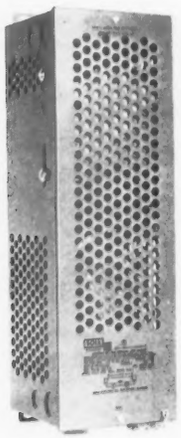
ASPHALT KARNAK PRODUCTS TRADE MARK

LEWIS ASPHALT ENGINEERING CORP.
30 CHURCH ST., NEW YORK 7, N. Y.

ASPHALT EMULSIONS • WOOD BLOCK MASTIC • ASPHALT PAINT • MASTIC FLOORING • DAMPPROOFING
ROOF COATINGS AND CEMENTS • PLASTER BOND • CORK FINISH • ASPHALT ALUMINUM COATINGS
PROTECTIVE COATINGS • WATERPROOFING ASPHALT • WATERPROOFING FABRIC • TILE CEMENT

Circle 120 for further information

back wiring, or side wiring only. Suitable for use with 4" outlet box covers. Design features include a red strap for 20 ampere identification.
AIA FILE NO. 31-C-71
MFR: ARROW-HART & HEGEMAN ELEC. CO.
Circle 228 for further information



TRANSFORMER KEEPS ONE LAMP BURNING

MFR'S DESCRIPTION: a two-lamp parallel mecury transformer that keeps one lamp burning should the other fail.
USES: industrial and institutional.
SPECS/FEATURES: circuiting of the transformer provides electrical independence between the two lamps. Failure of one lamp does not significantly affect the operation or light output of the remaining lamp. Constant wattage design limits starting current during lamp warmup. Lamp wattage and light output is maintained in spite of line voltage fluctuations. Lumen output is held constant. In addition, the primary current drops when an open or short-circuit condition occurs in the lamp circuit preventing the transformer from overheating. Constant wattage maintains the open circuit, and wattage to the lamps within the rated primary range. Product available in both indoor and outdoor weatherproof designs and in several primary voltage ratings.
AIA FILE NO. 31-B-6
MFR: SOLA ELECTRIC CO.
Circle 229 for further information

STAINLESS STEEL WALL PLATES

MFR'S DESCRIPTION: complete line of specification grade, type "302" stainless steel wall plates, 18 per cent chrome, 8 per cent nickel.
USES: institutions, laboratories, restaurants and bars, dairies, kitchens and bathrooms.
SPECS/FEATURES: type "302" has the highest degree of corrosion resistance of any of the stainless steels according to manufacturer. Type of stainless steel used in these wall plates match much of the stainless steel hardware found in modern buildings. Available for use with all manufacturer's strap type wiring devices and Despard interchangeable devices.
AIA FILE NO. 31-D-26.
MFR: PASS & SEYMOUR, INC.
Circle 230 for further information

HIGH FREQUENCY BUS DUCT

MFR'S DESCRIPTION: high frequency bus duct for transmitting electrical power in frequencies from 180 to 20,000 cycles.
USES: industrial and commercial.
SPECS/FEATURES: duct usable wherever industrial high frequency power required, including airports, laboratories, production facilities, electronic plants, missile and radar bases, high efficiency fluorescent lighting and induction heating systems. Central power plant can service an entire plant, with no need for small, individual high frequency generators. Voltage drop is less than 1 volt per 100' at 400 cycles, based on an equally distributed load, line to neutral value, at the most unfavorable power factor. Power is taken off by plugging in at takeoffs located every 30" along the run. Duct measures 9⅝" wide by 3⅞" high, and weighs 13 pounds per foot. Normally it is furnished in 10' lengths, but shorter lengths and special fittings are available to suit installation conditions.
AIA FILE NO. 31-B-6
MFR: STANDARD CONTROL DIV., WESTINGHOUSE ELECTRIC CORP.
Circle 231 for further information

MOTOR ACTUATORS IN VARIOUS MODELS

MFR'S DESCRIPTION: new line of motor actuators for positioning air damper, control valves, etc.
USES: commercial and industrial.
SPECS/FEATURES: motor actuators available in a variety of models for use with various types of electrical control devices. Models are available with various operating speeds and output torques. Models also available which incorporate an additional balancing potentiometer for the simultaneous operation of a second motor actuator. Designated *Type MA*, these motor actuators are powered by a split phase capacitor type motor which drives the output shaft through reduction gears. Limit switches stop the actuator movement at predetermined travel limits. Proportional motor actuators include a potentiometer which is positioned directly from the output shaft to provide a variable voltage signal indicative of actuator position. Motor actuators operate on 24 volts, AC, 50-60 cycles. Input is 16 VA. Control circuit is 3-wire, 24 volt. Proportional actuators use 135 ohm, 2 watt potentiometers. Motor actuator is finished in gray hammerloid baked enamel.
AIA FILE NO. 31-D-9.
MFR: PENN CONTROLS, INC.
Circle 232 for further information

ALUMINUM ELECTRICAL FLANGE FITTING

MFR'S DESCRIPTION: flange fitting for installing many kinds of electrical equipment.
USES: electrical applications.
SPECS/FEATURES: receptacle outlets, switches, pilot lights, electrolets, FS fittings and similar units can be used with this flange fitting, according to manufacturer. Item can be mounted on 3¼" outlet boxes, junction boxes, or on table tops and other surfaces. Device is aluminum and four holes are provided for attaching screws or bolts.
AIA FILE NO. 31-C-71
MFR: KILLARK ELECTRIC MANUFACTURING CO.
Circle 233 for further information

PLASTICS

FIBER GLASS GRAVELSTOP

MFR'S DESCRIPTION: available in white, copper and aluminum colors, in 2', 4', 6', 8' and 10' lengths.
USES: residential, commercial and industrial applications.
SPECS/FEATURES: designed with a spring action, the fiber glass gravelstop fits snugly against eaves boards. Nailing is with regular roofing nails which go through pre-cut expansion slots on the roofdeck side. This eliminates face nailing. Item is strong enough to support ladder weight without deforming. Installation requires only hammer and saw. Connectors are used to cover small exposed areas between lengths. The fiber glass manufacture prevents decay or erosion. The commercial line, comparable in thickness to 14-ga. metal, retails at 88¢ a linear foot, the residential line at 44¢.
AIA FILE NO. 12-H
MFR: SPACE STRUCTURES, INC.
Circle 234 for further information

FIBER GLASS PANELS FROM NEW SOURCE

MFR'S DESCRIPTION: daylighting panels designed for roof and sidewall lighting.
USES: commercial and industrial.
SPECS/FEATURES: manufacturer is a major supplier of fiber glass materials to other panel manufacturers. This is initial entry of company into production of the finished product. The new panels use 100 per cent acrylic resin as the bonding agent. The *Lucite* resin resists weathering and improves light diffusion. Panels are available in four colors permitting 80 to 60 per cent light transmission. Applications for new panel include skylights, siding, partitioning, replacements of existing sash and glazing, and housing and equipment covers. Panel, according to manufacturer will not rot, rust, corrode or peel. Manufacturer states price will be somewhat higher than competing products.
AIA FILE NO. 26-A-5.
MFR: OWENS-CORNING FIBERGLAS CORP.
Circle 235 for further information

FIBER GLASS FLOOR DRAIN

MFR'S DESCRIPTION: fabricated floor drain of reinforced fiber glass.
USES: industrial.
SPECS/FEATURES: intended for use where danger from sparks is present, fabricated floor drain made of reinforced fiber glass is designed for use in atomic reactor rooms, radiation laboratories and areas where combustible fumes may exist.
AIA FILE NO. 29-C-3
MFR: JOSAM MANUFACTURING CO.
Circle 236 for further information

looking for space to hang up a phone?

Only 28¾ in. square! That's *26 per cent less* space—for the Alcoa® Aluminum "Compact" Booth—than you need for conventional, bigger telephone booths!

Simple, clean lines and tough Alumilite* finish provide compatibility with *any* modern office building's décor.

REA and CSA accepted . . . inspected and approved by Underwriters' Laboratories, Inc. For the above booklet with specifications and list of jobbers, write: Aluminum Company of America, 1783-E Alcoa Building, Pittsburgh 19, Pa.

*Trade Name of Aluminum Company of America

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Circle 121 for further information

PRODUCTS, EQUIPMENT, MATERIALS

OFFICE AIDS

HYDRAULIC DRAFTING TABLE

MFR'S DESCRIPTION: hydraulic drafting table with ability to move vertically and 360° horizontally.

USES: drafting rooms.

SPECS/FEATURES: hydraulic drafting table, the vertical traverse of which is nearly 2' with angle adjustment ranging from horizontal to vertical. Board can be rotated 360° around the base. Manufacturer points out the ability to rotate the table offers a choice of the best lighting—natural or artificial. Apparatus is stable without floor attachments. A low center of gravity permits free placement. Hole vents on the edges of the boards provide moisture equalization throughout the interior of the core. Separate instrument trays are provided at the side. The board is 40"x 60". An optional resilient plastic board covering is available. This is not glued on and both sides may be used. Price is approximately $250.

AIA FILE NO. 35-H-3

MFR: ISIS, INC.

Circle 237 for further information

RESILIENT PLASTIC BOARD COVERING

MFR'S DESCRIPTION: resilient plastic covering for drafting boards.

USES: drafting tables, etc.

SPECS/FEATURES: resilient plastic board covering, one side green, the other ivory. Cleaning is with household cleaners and damp sponge. Resiliency makes cuts and compass point holes tend to close. Plastic is attached with strip of double coated tape along the edges of the drawing board. Tape is concealed, and the material lies flat as if it were glued to the drawing board. Many draftsmen remove the tape from the sides and bottom of the board after the plastic has completely flattened out, so that the expansion and contraction of the board will be independent of the plastic board covering. This practice also insures against board warping. Plastic can be cut with scissors or razor. Various sizes available, from 37½" to 43½" widths. Prices for the 10-yard rolls start at $5.85 per linear yard. Smaller pieces also available.

AIA FILE NO. 35-H-3

MFR: ISIS, INC.

Circle 238 for further information

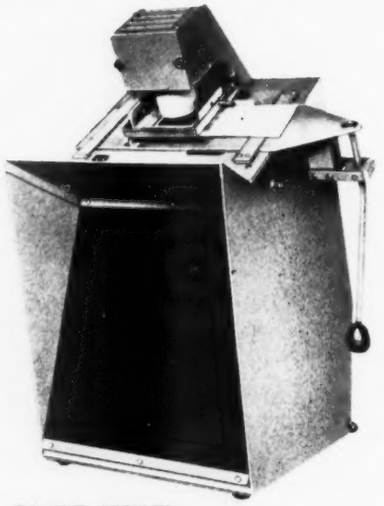


TABLE MODEL MICROFILM READER

MFR'S DESCRIPTION: table model 35 millimeter microfilm card reader.

USES: projection.

SPECS/FEATURES: Model *4305* designed for brilliantly lighted rooms and offices. Item projects a sharp, brilliant image of uniform intensity on a 10½" x 12" glare-free screen of plastic crystals, company says. Unit has a 14X magnifying power. Single control moves film image in all directions and model has a scanning device for rapid viewing of selected film image areas. Film is protected by a glass film gate carrier which does not interfere with focus. Item is 23½" high, 11" wide, and 19" deep. Operates on standard 115 volt 60 cycle, ½ amp, AC current.

AIA FILE NO. 35-A-21

MFR: EUGENE DIETZGEN CO.

Circle 239 for further information

MOSAIC PATTERNS AND SIGNS

MFR'S DESCRIPTION: decorative mosaic squares that snap and lock into place on company's fixtures to act as directional signs or for decoration.

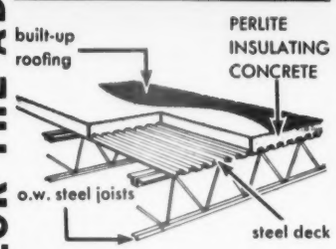
USES: commercial interiors.

SPECS/FEATURES: supplied in shades

✓ CHECK THE ADVANTAGES OF

Perlite

INSULATING CONCRETE FOR ROOF DECKS



Here are only a few of the reasons why you should specify this modern, practical construction material on your next project.

Perlite Insulating Concrete is lightweight, yet exceedingly strong where combined wide spans and high load carrying capacities are required.

Perlite Insulating Concrete forms a fire safe permanent insulating roof deck that offers up to 20 times more Thermal insulation than ordinary concrete.

Perlite Insulating Concrete bonds directly to galvanized metal and eliminates the necessity of a combustible bonding agent used under rigid insulation.

Perlite Insulating Concrete's low dead load offers savings in structural steel. It may be job or transit mixed and poured monolithically on any kind of surface or pre-cast into panels or slabs.

For further information see Perlite Institute Concrete Aggregate Catalog A.I.A. File 3-D-3 & 37-B-2 in Sweet's 1961 Architectural File or write for catalog PI-7.

Information and data based upon independent research laboratory tests and ASTM specs.

Perlite INSTITUTE INC.

International Association of Perlite Producers
45 W. 45TH ST., NEW YORK 36, NEW YORK

Circle 122 for further information

of blue, orange, green and red, squares may be used to form arrows, room numbers, point out a department, or to form any mosaic design or pattern.

AIA FILE NO. 23-K-1

MFR: EDWIN F. GUTH CO.

Circle 240 for further information

POCKET-SIZED DRAWING KIT

MFR'S DESCRIPTION: pocket-sized drawing kit designated *Polyangle*, with a standard pad, provides complete drafting facilities.

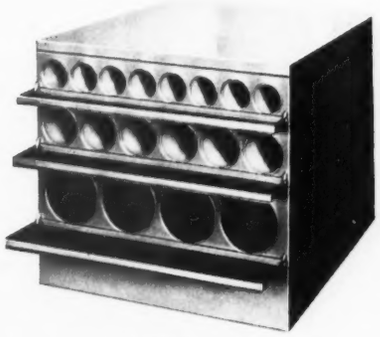
USES: field sketching.

SPECS/FEATURES: adjusts to a pad for accurate field sketching or drawing to scale. Pocket-size when folded in its carrying case. Main scale slides to provide parallel horizontal position of 30°, 45°, 60°, 90°, 120°, 135°, 150°, either above or below the horizontal. Arm sets to angles, remains in position and can be moved horizontally while maintaining angle setting. Instrument is constructed of polystyrene and is color-tinted to provide contrasts to the pad. Available, complete with carrying case and instructions, for $1.95.

AIA FILE NO. 35-H-3

MFR: COUNTRY ENGINEERING, INC.

Circle 241 for further information



FILING SYSTEM FOR ROLLED MATERIAL

MFR'S DESCRIPTION: modular approach to filing rolled tracings, prints and other rolled materials.

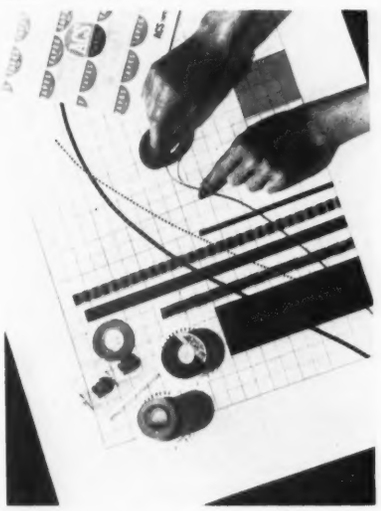
USES: architects, designers, and engineering offices.

SPECS/FEATURES: *Moducor* system provides flexibility in rolled filing equipment with varying tube dimensions to fit every size, type or activity of stored materials, manufacturer says. System consists of four, six and eight tube modules in 4", 2⅝" and 1⅞" diameter tubes. All modules are of a standard width to permit stacking any size modules for varying storage and activity requirements. Individual tubes are paper laminate, foil wrapped with steel ends. Tubes are anchored mechanically in a metal frame to prevent accidental tube removal while permitting easy insertion of a new tube without requiring tools, paste or glue. Clip interlocking device helps assure safe, stable stacking to any practical height and assures both lateral and vertical stability. All modules are a uniform 18¾" wide and are offered in lengths varying in 6" increments from 24" to 60" in length. Module heights vary according to tube diameter. Unit heights are designed to be systematically varied.

AIA FILE NO. 35-H-32

MFR: HAMILTON MANUFACTURING CO.

Circle 242 for further information

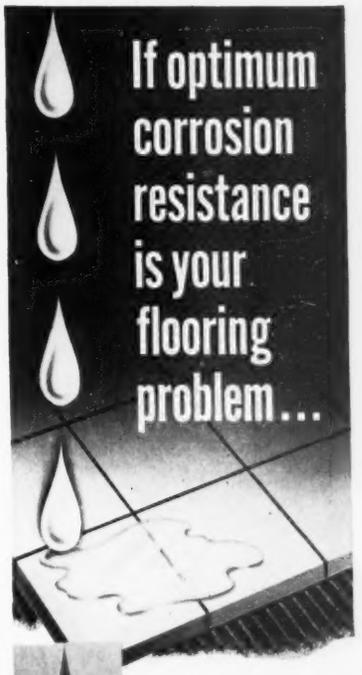


TRANSPARENT PATTERNED AND COLORED TAPES

MFR'S DESCRIPTION: transparent, self-sticking tapes in colors or patterns and various widths.

USES: art-work, graphs and rendering work.

SPECS/FEATURES: tapes are designed for use in preparing artwork, slides, transparencies, etc. When overlayed on maps, drawings, layouts and graphs, color can be used without obscuring detail. Material can be written on and is non-reflecting. Equipped with non-oozing adhesive. Available in 20 solid colors and ten patterns. Widths range in ten sizes



U-poxy

is your answer!

Revolutionary New Epoxy Grout and Setting Compound Makes Joints as Impervious to Corrosion as the Tile Itself!

Ideal for dairies, packing plants, canneries, bakeries, breweries, distilleries, food processing plants — wherever corrosives are encountered. Forms a dense, tight joint of phenomenal strength. For new installations or re-grouting existing floors. Only water is needed for clean-up. Details in Sweet's or write for a descriptive catalog.

Pioneers in Industrial Research Since 1881

THE UPCO CO.

4805 Lexington Ave. Cleveland 3, Ohio

Circle 123 for further information

Treat concrete structures right

THOROSEAL

against water, weather, erosion

insure handsome long life

Specify Thoroseal to block out spalling, corrosion, freeze-thaw damage. Cementitious coating keeps out water. Compatible with all masonry and concrete — penetrates deeply and bonds right into the pores.

keep clean-lined designs

Thoroseal actually becomes part of the wall it coats — and lasts just as long! Not like a thin paint film. Thoroseal lets wall "breathe" so water vapor can't accumulate. Seals weather out for good!

top rating for 49 years

Don't trust **your** structures to untried products. Rely on the protection that's been job-tested since 1912. Nearly half a century of top performance, under every extreme of weather, water pressure and temperature.

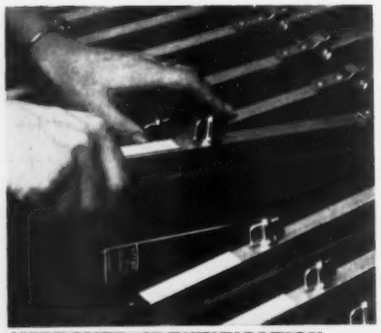
WATERPLUG

● Building site water problems? Ask about Waterplug — a perfect hydraulic cement; stops even high-pressure leaks instantly. Request free specification guide on all our materials for masonry and concrete.

STANDARD **DRY WALL** PRODUCTS, INC.
DEPT. A-3 NEW EAGLE, PENNA.

Circle 124 for further information

from 1/32" to 1". Length of roll is 324". Prices range from .70¢ to $2.25, depending on width.
AIA FILE NO. 24-A
MFR: ACS TAPES, INC.
Circle 243 for further information



IMPROVED IDENTIFICATION FOR VERTICAL FILES

MFR'S DESCRIPTION: addition to company's plan holding binders of identification cards.
USES: drafting rooms, etc.
SPECS/FEATURES: manufacturer adding a 3" plastic window to company's line of plan holding binders, together with identification cards of same length, and high enough to take three lines of type. Plastic window clips added to the binder hold and protect the identification card. Present users of company's file binders can obtain a supply of "windows" from their original dealer at no charge.
AIA FILE NO. 35-H-32
MFR: PLAN HOLD CORP.
Circle 244 for further information

LINE OF DRAFTING TABLES WITH MOVING STRAIGHT EDGE

MFR'S DESCRIPTION: line of drafting tables with moving straight edge.
USES: drafting.
SPECS/FEATURES: three sizes of all steel drafting tables with either horizontal or vertical moving straight edge. Straight edge rides on a rack and gear mechanism. Top tilts from 0° to 45°. Glass portion of top is illuminated. Adjustable stops that engage the moving straight edge are provided. Adjustable fluorescent light, catch-all shelf, and three-drawer storage unit are accessories. Prices start at $395.
AIA FILE NO. 35-H-3.
MFR: NUARC CO., INC.
Circle 245 for further information

BONDINGS/ADHESIVES

EPOXY ADHESIVE FOR BONDING GLASS

MFR'S DESCRIPTION: epoxy adhesive developed mainly, but not exclusively for bonding glass.
USES: residential, commercial and industrial.
SPECS/FEATURES: item is a high-strength, flexible epoxy-resin adhesive formulated for bonding glass to glass and for joining glass to concrete, masonry, metals, most plastics, marble and similar structural materials. Item utilizes a minimum irritation curing system and is generally non-sensitizing and non-toxic. It is a two-component, room-temperature curing, solventless, controlled-flow liquid adhesive which is mixed just before use. It is waterproof and resistant to sunlight, climatic changes and temperatures from −67° F +220° F, the manufacturer says.
AIA FILE NO. 24-A
MFR: ADHESIVE ENGINEERING
Circle 246 for further information

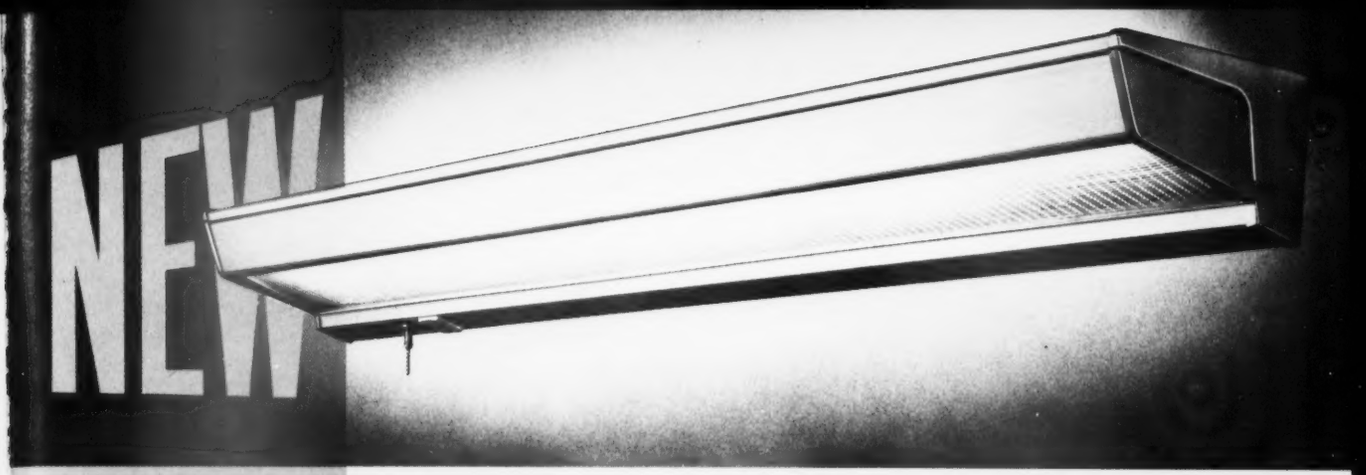
GENERAL PURPOSE CONTACT CEMENT

MFR'S DESCRIPTION: designated *CA-25*, item is a general purpose industrial adhesive.
USES: general bonding of various materials.
SPECS/FEATURES: item recommended for laminating plastic to wood, metal, plastic, glass surfaces, metal trim to wood and metal or masonry surfaces. Product is a synthetic rubber base solvent and forms an immediate and permanent bond without the need of sustained pressure from clamps or presses. Adhesive strength obtained without heat, and bond is said to improve with age. Bond is flexible and will withstand constant or variable stresses, impact and vibration, as well as expansion and contraction caused by rapid temperature changes. Product is unaffected by moisture, age, acids and is animal and insect-proof, manufacturer says.
AIA FILE NO. 21-A-51
MFR: MIRACLE ADHESIVES CORP.
Circle 247 for further information

MONO-PACKAGED SEALANT KIT

MFR'S DESCRIPTION: one-container packaging of two-part thiokol-base sealants with synthetic rubber sealant.
USES: caulking and glazing, includ-

Circle 125 for further information about DAY-BRITE→



HOSPITAL PATIENTS LOOK BETTER, SEE BETTER, FEEL BETTER WITH NEW DAY-BRITE TRANQUILITE

...A "Decidedly Better" Hospital Bed Light!

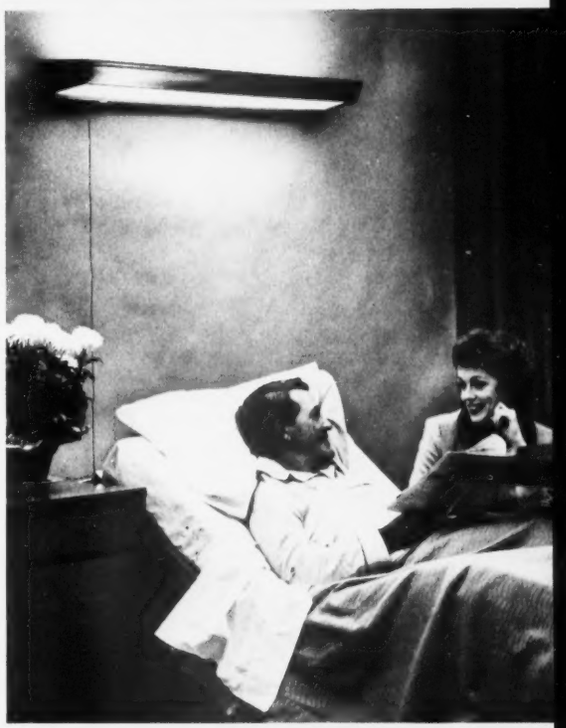
- Switching provides reading light, night lite and general illumination
- Convenient electric outlet for examining light, electric razor or radio
- Reduces glare . . . ideal for multiple patient rooms and wards
- Available in 2 or 4-foot lengths, stainless steel or baked white enamel finish

You can actually *see* the difference TRANQUILITE makes! Cold, clinical looking hospital rooms take on new warmth, become more inviting. Patients perk up.

In older rooms, defects seem to disappear under TRANQUILITE's soft illumination, evenly diffused through CLEAR-TEX®-type enclosures.

Whether you're looking for the most efficient way to light new rooms, or an economical way to modernize older ones, Day-Brite TRANQUILITE is the right light for you!

TRANQUILITE is just one of a complete line of "Decidedly Better" Day-Brite fixtures that satisfy every hospital lighting need . . . all *easy to clean / easy to install / easy to maintain.* For full details, phone your Day-Brite representative listed in the Yellow Pages, or . . .



Mail coupon for FREE "Hospital Lighting Manual"

Informative 24-page booklet gives current IES recommended illumination levels and practical lighting lay-out suggestions for all hospital areas. No obligation. Just fill out coupon, detach and mail TODAY. No postage needed!

DAY-BRITE

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

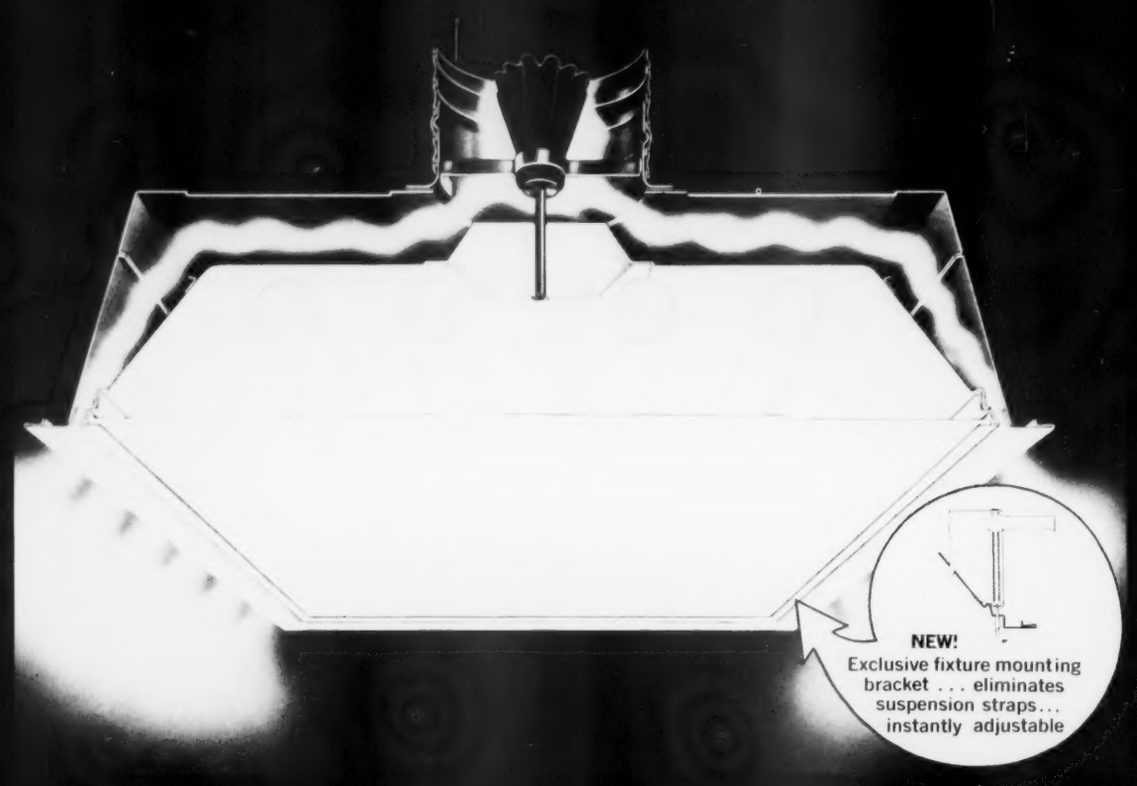
JUST DETACH AND MAIL . . . NO POSTAGE NEEDED

FIRST CLASS
Permit No. 281
St. Louis, Missouri

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

Marketing Division
DAY-BRITE LIGHTING, INC.
6260 North Broadway
St. Louis 15, Mo.



MAIL COUPON FOR FREE 24-PAGE GUIDE TO "COMFORT CONDITIONING WITH LIGHT AND AIR"

No Postage Needed—Just Detach and Mail

DAY-BRITE LIGHTING, INC.
6260 N. Broadway, St. Louis 15, Mo.

- ☐ Please send me free "Comfort Conditioning with Light and Air."
- ☐ Please send me free "Hospital Lighting Manual."
- ☐ Please have Day-Brite representative contact me.
- ☐ I would like a free estimate with no obligation.
- ☐ New construction ☐ Re-lighting present facilities

Company Name_____

Name _____ Title_____

Address_____

City_____ Zone ____ State _____

My Electrical contractor is_____ **AEN**

• FOR CLEAN, UNCLUTTERED CEILINGS here's quality lighting and air distribution combined in one beautifully designed unit.

• NO SACRIFICE OF LIGHTING EFFICIENCY. Day-Brite's patented double-wall construction isolates air flow from lamps. Requires no more cleaning than ordinary fixtures.

• MORE UNIFORM AIR DISTRIBUTION. Every lighting fixture can also be an air diffusing source . . . or use in combination with fixtures equipped with matching enclosing elements.

Get all the facts you're looking for on Day-Brite Air Diffusing Lighting Fixtures in a handy booklet. Includes full performance data and information required for installation planning. Mail coupon today for your free copy! *Day-Brite Lighting, Inc., St. Louis, Mo., and Santa Clara, Calif. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ont.*

DAY-BRITE

NATION'S LARGEST MANUFACTURER OF
COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

ing expansion joints and curtain wall sealing.

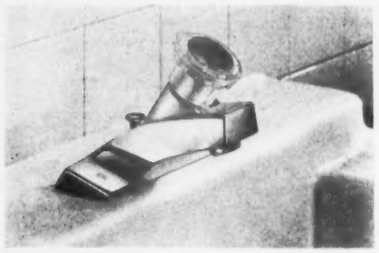
SPECS/FEATURES: base and catylist are both contained in a single can, separated by a miscible barrier which, when stirred, becomes part of the sealant. Product helps eliminate material loss and human error. Requires no measuring, special tools, equipment or clean-up. Kit includes compound, loading disc and cartridge. Has a four hour open time and sets rubbery tough in 24 hours at 70° F.

AIA FILE NO. 7-D.

MFR: PLASTOID PRODUCTS.

Circle 248 for further information

RESIDENTIAL



ONE-KNOB CONTROLS LAVATORY FAUCET

MFR'S DESCRIPTION: one knob lavatory faucet with all operating parts contained in sealed, replaceable cartridge. Utilizes same operating principles as mixing valves for shower and bath installations.

USES: residential applications.

SPECS/FEATURES: merges the two-handle operation lavatory faucet into one knob. One knob controls water temperature and flow. Cartridge replacement containing all operating parts available for $2.00. One knob lavatory faucet available in same design as manufacturer's shower and bath water controls. Item carries one-year warranty.

AIA FILE NO. 29-H-5.

MFR: MOEN FAUCET DIV., OF STANDARD SCREW CO.

Circle 249 for further information

RESIDENTIAL FREEZING UNIT

MFR'S DESCRIPTION: freezer designed to fit under counter-top range.

USES: residential.

SPECS/FEATURES: freezer designated as *King 399* fits under any 40" counter-top range. Freezer has two pull-out freezer baskets, a full-size refrigerated shelf, and storage space on both doors. Outer part of doors stainless steel which matches many standard ranges. Plastic inner door liners and magnetic gaskets on both doors are featured by manufacturer. A heat-disposal fan makes it possible to install this freezer flush with cabinets and walls.

AIA FILE NO. 35-C-11

MFR: KING REFRIGERATOR CORP.

Circle 250 for further information

ADDITIONS TO FOOD DISPOSER LINE

MFR'S DESCRIPTION: addition of two units to manufacturer's food waste disposer line.

USES: residential food waste disposal.

SPECS/FEATURES: *Sovereign* unit is 12 13/16" high and is teal blue with chrome trim. *Scepter* model is 11 9/16", mandarin red with white trim. Manufacturer says with these models garbage can be rinsed continuously down the drain, or locked in the grinding chamber before operation begins. Rubber-coated grinding chamber, specially designed stopper and mineral wool insulation, help deaden operating sounds. Larger model has a "rind-kicker" for faster elimination of bulk wastes. Models also feature shock-absorbent mounting gasket to minimize vibration; stainless steel grinding chamber, reversible and replaceable stainless steel cutting teeth; weighted cutter disc, compact capacitor-start factory-sealed motor with overload protector.

AIA FILE NO. 35-J-4.

MFR: AMERICAN-STANDARD CORP.

Circle 251 for further information

CLOCK AND SAFE IN MEDICINE CHEST

MFR'S DESCRIPTION: electric clock and safety chest recessed in medicine cabinet.

USES: residential applications.

SPECS/FEATURES: recessed electric clock with luminous dial and night-light. Clock doesn't interfere with mirror space, and can be seen through cut when mirror is closed. Key-locked safety chest keeps medicines away from children. Unit has non-glare vertical fluorescent lights at both sides. Both clock and safety chest are suspended at the interior left-hand side and do not take up shelf space. Prices range at retail from $65 to $85. Available in two sizes.

AIA FILE NO. 29-J.

MFR: KENT CORP.

Circle 252 for further information

AUTOMATIC HOME TESTING FOR SEPTIC TANKS

MFR'S DESCRIPTION: electronic sensing unit that indicates when a septic tank needs cleaning.

USES: residential.

SPECS/FEATURES: testing unit for septic tanks operates by pressing a button inside the house. Item works by electronically measuring three critical layers inside the tank and warns house-owner by indicator. Each unit designed for the specific septic tank involved, and manufacturer states units carried in the line now available for the majority of manufacturer's standard tanks.

AIA FILE NO. 29-C.

MFR: PHILIP SITTON CORP.

Circle 253 for further information

MISCELLANY

WATER VALVES WITH VALVE OPERATOR SEALED

MFR'S DESCRIPTION: straight-through or diverting water valves for heating systems.

USES: residential, commercial and industrial heating applications.

SPECS/FEATURES: two new lines of water valve systems feature a valve operator sealed in a metal case. Shaded pole motor replaces conventional "clock-type" motors in other models. All gears are made of *Du Pont Delrin*. Motor and gear train are immersed in oil and sealed inside a metal casting. Barrel-type valve stem is self-aligning and utilizes line pressure for better seal-off without bind on opening or closing. Valve bodies and bayonet-type operator attachment lugs are cast in low-zinc brass. Terminal panel is built with push-in connections for solid #18 to #16 *AWG* thermostat wire. Wires can be disengaged immediately by depressing the pin set beside

Why take less . . . when CORDLEY offers *more:*

More Cooler Experience. Water Coolers are Cordley's *only* business, not a side line.

More Assurance of Satisfaction. Cordley's full 5-year guaranty is by far the strongest in the industry.

More Help in choosing the right coolers for your use...from Cordley's line of 28 job-rated models. 4439

The New CORDWALL LINE

No plumbing shows. Flush to the wall. No dirt can get behind. 3 wall models for installation at any height. 5 floor models. See Yellow Pages for nearest Cordley Distributor. Ask for Catalog 61.

CORDLEY & HAYES

Specialists in water cooling since 1889

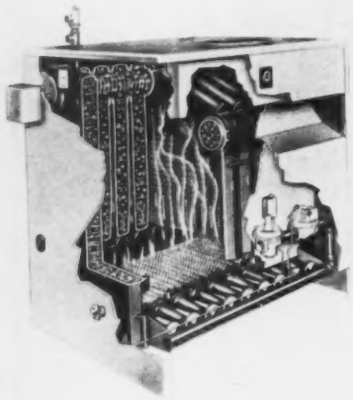
443 Park Avenue South, New York 16, N. Y.

each wire hole. Valve operated manually by turning notched wheel in the valve head. Wheel turns with the stem and shows its exact position at all times.

AIA FILE NO. 34-E-1

MFR: WHITE-RODGERS

Circle 254 for further information



GAS BOILER WITH BUILT-IN AIR ELIMINATOR

MFR'S DESCRIPTION: gas boiler designed for installation in larger residences and smaller apartment and commercial buildings.

USES: residential and commercial.

SPECS/FEATURES: boiler, called *G-40*, has built-in air eliminator. No separate water heater required since boiler has tankless water heater suitable for steam or water installations. Larger BTU/hr input per burner results in fewer sections, reducing relative size. Up to six sections can be ordered pre-assembled, with or without the tankless heater installed. Featured are the 3" supply tappings at the top rear of each end section, permitting use of either outlet to help simplify piping hook-up. Other features include easy inspection and cleaning of sections, optional jacket extension to cover exposed controls mounted on the left side, optional dual gas equipment, 50 psi water working pressure and large supply tappings, often required for steam replacement work.

AIA FILE NO. 30-C-1

MFR: AMERICAN-STANDARD CORP.

Circle 255 for further information

PIGMENT ADDITIVE FOR CONCRETE CURING

MFR'S DESCRIPTION: formula designed to keep pigment in concrete curing compound in suspension.

USES: concrete curing.

Circle 127 for further information→

DEPENDABLE Cupples

an Important Message

on the subject of stock doors and entrances

Cupples new "40 LINE" offers complete design flexibility, simplicity of installation, dependability of product and manufacturer, at prices your clients will appreciate.

In designing and developing our new "40 line" of standard custom framing and stock entrance doors, Cupples has worked to give you a line of superior products you'll be proud to specify for any job. Embodying the latest advances in engineering and production, Cupples new "40 line" of stock doors and frames is simplicity itself. It not only saves time and labor in assembly and on-the-job installation, but it offers you complete design flexibility for any job requirement.

Consider for a moment these outstanding features and you'll see why architects and building owners are so enthusiastic about Cupples entrance doors and frames.

THE DOOR: Adjustable setting block permits proper alignment after glazing. Choice of offset pivots, butts or concealed overhead closers. Square cut horizontals are easily cut for size adjustment. Tension rod holds styles together at top and bottom. Strong corner construction with plug as integral part of extrusion. Stock push-pull hardware, interchangeable with custom styled hardware. Stock panic device doors also available.

THE FRAME: Quickly assembled frame, full 1/8" thick extruded aluminum. Flush glazing eliminates glass stops. Dry glazing with same type vinyl front and back. Inexpensive joint connections save time and labor. Special adapter channel adjusts frame to irregularities of rough openings.

Now add to all these features the DEPENDABILITY of product, of service and delivery, and the company behind the product... and you'll quickly realize that your client gets more for his money when you specify "Cupples." Write today for Free file copy of our catalog or consult Sweet's, Section 16a/Cu.

CUPPLES PRODUCTS CORPORATION

A DIVISION OF ALUMINUM COMPANY OF AMERICA

DOWAGIAC, MICHIGAN

ALCOA

CUPPLES PRODUCTS DIVISION

A complete line of custom and standard doors, store front metal, custom and stock curtain walls, stock projected windows, stock and special sliding glass doors. All Alumilited finishes are bonded and guaranteed.

PRODUCTS, EQUIPMENT, MATERIALS

SPECS/FEATURES: homogenized type concrete curing compound with a special additive to keep pigments in suspension. Product also features only the finest type particles of white pigment or titanium type A in the curing compound, manufacturer says. With new additive, pigment can be put into suspension faster and easier and will remain in suspension longer, company adds. Pigment is designed not to clog spraying nozzles.

AIA FILE NO. 4-C-2.

MFR: W. R. MEADOWS, INC.

Circle 256 for further information

FLOOR INSTALLED ADJUSTABLE DOOR CONTROLS

MFR'S DESCRIPTION: designated *No. 27* and *No. 28*, mechanisms are built for single acting entrance, vestibule and heavy interior doors, either center hung or offset hung 3/4" or 1 1/2".

USES: commercial and industrial.

SPECS/FEATURES: floor installed door control mechanisms with five separate built-in door controls, each adjustable at any time after installation. To accommodate for variations of wind and draft conditions, separate adjustments change the door's closing speed from slow to fast and the latching pressure from firm to gentle. Back-check resistance increased or decreased at will. Selector hold-open permits switching from non-hold-open to automatic hold-open. Item may be specified without hold-open or with automatic hold-open. A dead stop is built in to stop the door at one of three pre-specified positions: 85°, 90° and 150°. Selector and automatic hold-open types also hold the door at the pre-specified dead stop position.

AIA FILE NO. 27-B.

MFR. THE OSCAR C. RIXSON CO.

Circle 257 for further information

PLYWOOD ADDS TWO PLYS FOR SAME THICKNESS

MFR'S DESCRIPTION: two plys of resin impregnated wood fiber added to conventional three or five plys of wood veneer. The 4'x8' interior or exterior panels range from 3/8" to 3/4" in thickness.

USES: walls, panels, sub-flooring and sub-roofing.

SPECS/FEATURES: manufacturer states the addition of two "plys" eliminates need for a paint undercoat and adds to panel's stability. Smoother and harder surface reduces amount of paint required and adds to life of paint job. The two extra plys eliminate checking and minimize grain

←Circle 127 for further information

how to Observe without being Seen

A. and T. College, Greensboro, N. C., McMinn, Norfleet & Wicker, architects.

From the darker observation room, it's a window . . .

From the brighter classroom, it's a mirror!

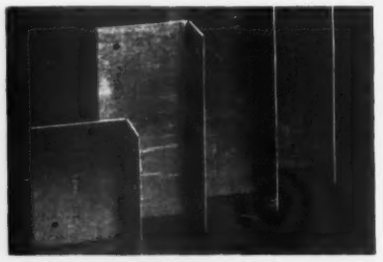
It's Mirropane®, the "see-thru" mirror. Useful in schools, banks, hospitals, stores, homes . . . anywhere you want to observe without being seen. When *Mirropane* is made with clear plate glass, a light intensity differential of about 7 to 1 is required. For best performance, use *Mirropane* made with *Parallel-O-Grey®* plate glass. This reduces the light intensity differential to about 3 to 1. Call your L·O·F distributor or dealer, listed under "Glass" in the Yellow Pages, or write L·O·F, 7831 Libbey·Owens·Ford Building, Toledo 1, Ohio.

MIRROPANE
the "see-thru" mirror
LIBBEY·OWENS·FORD
L·O·F GLASS

Circle 128 for further information

PRODUCTS, EQUIPMENT, MATERIALS

raise. Material tested for use anywhere conventional interior or exterior type is used.
AIA FILE NO. 19-A-1
MFR: GEORGIA-PACIFIC CORP.
Circle 258 for further information



WOOD REINFORCING STEEL ANGLES

MFR'S DESCRIPTION: series of reinforcing angles added to company's line of timber connectors and framing devices.
USES: general utility wood-to-wood connections.
SPECS/FEATURES: designated *Teco*, series is available in 3", 5", 7" and 9" lengths. Applications of product for wood framing include: posts to beams and plates, beams to girders, and solid blocking to plates. Latter application often used where a transfer of seismic loads is desired, company states. Furnished with each carton of product are 9 ga., 1½" nails. A 16 ga. galvanized sheet steel is used in manufacture.
AIA FILE NO. 14-J
MFR: TIMBER ENGINEERING CO.
Circle 259 for further information

COLLAPSIBLE FIRE LADDER

MFR'S DESCRIPTION: collapsible aluminum fire ladder resembling a drainpipe and measures 2"x2½" when folded.
USES: multi-storied buildings.
SPECS/FEATURES: ladder attaches to any exterior surface of a building. Slight pressure on a tripping device which can be operated only at an upper window level opens the rungs, then locks into place and provides descent to ground level. Access to ladder is from the side with ample toe and hand room. Item will carry a one-ton load. After use, ladder retracts to its rainpipe profile. Needs no painting, lubrication or maintenance. The approximate retail price is $75. for a two-story building.
AIA FILE NO. 14-D
MFR: SAFE-X-SCAPE DIV., WIN-CHEK INDUSTRIES
Circle 260 for further information

Hendrick Mitco...
the grating with the "Internal Rivet"

Hendrick Mitco grating is "quality manufactured" by forcing rectangular square-edged bars into integral panels under hundreds of tons of hydraulic pressure. The resulting cold flow of expanding metal locks the transverse bars and cross bars together in the form of an indestructible "internal rivet." Hendrick Mitco is available in like designs in steel, stainless steel, aluminum and magnesium. For applications where economy is a factor, Hendrick welded grating is also available.

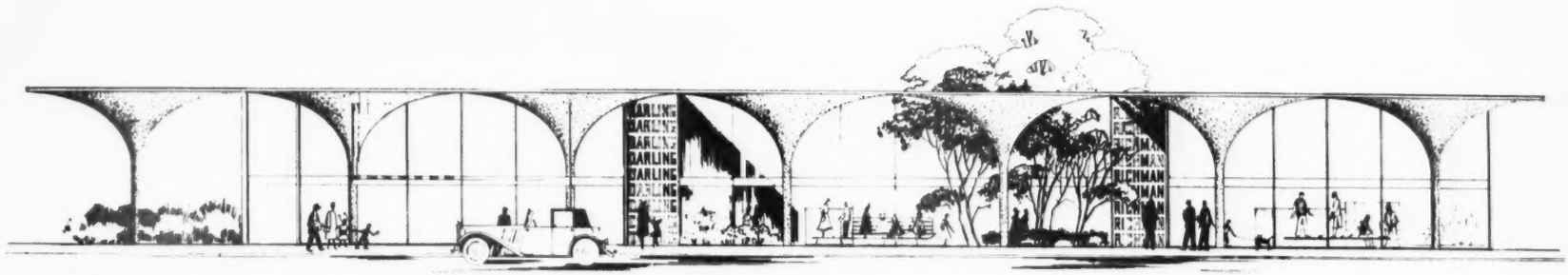
HENDRICK
Manufacturing Company
Carbondale, Pa.

PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE SLOT AND HENDRICK WEDGE WIRE SCREENS • ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING • SHUR-SITE TREADS ARMORGRIDS • HENDRICK HYDRO DEHAZER

Circle 129 for further information

THE ANATOMY OF A NEW PROJECT **PREVIEW: 30**

FAMILY CLOTHING CENTER	PROJECT
RICHMAN BROTHERS	CLIENT
JOHN TERENCE KELLY	ARCHITECT
R. M. GENSERT ASSOCIATES	STRUCTURAL ENGINEER
ANDREW PSIAKIS	MECHANICAL ENGINEER
ANTON EICHMULLER	ELECTRICAL ENGINEER



STREET ELEVATION

General program

In an effort to remove themselves from rented stores in shopping centers, Richman Brothers, manufacturers of men's furnishings, decided to locate themselves in their own buildings. These would be roadside stores opposite or near existing successful shopping centers. This project is the first, and is being built in cooperation with a women's shop and a shoe shop to form a family clothing center.

Site

The site chosen for the first building is an irregularly shaped plot consisting of two acres on Lafayette Road (U. S. Route 52) opposite the Eagledale Shopping Center in Indianapolis, Ind. There will be 15,200 square feet of retail area under roof with parking for 177 cars. The building is centered on the site with the parking surrounding it.

Design concept

It was the client's wish to have a building which would create an image for them throughout the country. To do this, the architect has used a 30′ x 30′ hyperbolic paraboloid. This is the basic building block. For local site variations and local retail conditions the number of these blocks will be varied. This particular project uses 24 basic blocks. It was important that all three stores strike a balance between corporate unity and individual shops. None was to lose its identity; however, for the motorist going by at 30 miles an hour, the combination of the three of them had to be striking enough to attract customers. The interiors of the shops themselves are partitioned one from the other by show cases and merchandise racks. A 20′ height is used to give these shops the scale of downtown retail establishments rather than the normal 12′ ceiling found in many shopping centers.

Construction

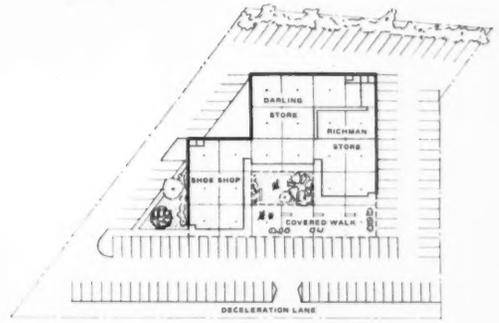
The hyperbolic paraboloids and their columns are reinforced concrete. They spring from a height of 11′ to an ultimate height of 20′. Shell thickness is 2½″. Ribs run perpendicular from the column faces and vary from a thickness of 1′ to 6″. There are 1½ tons of reinforcing steel for each shell column and footing. All reinforcing in the shell is made of straight hooked bars. Form work is to be constructed of plastic covered plywood.

Form work

Each paraboloid form is built in four quadrants. These will be on scaffolding and wheels. Four complete sets of forms will be built, and each set will be used six times. Richman Brothers will purchase the forms directly after this project is completed for use in other projects in other cities. Installation is on top of the roof upon which three ply built-up roof will be applied. There will be no grinding of the finished concrete surfaces. Any fins will be removed and two coats of *Thoroseal* will be applied. All exterior walls of masonry will be installed between the top of the walls and the paraboloids. All glass walls are ¼″ plate. All mullions are on 7′-4″ centers and will be of 2″ x 10″ oak. A ½″ x 1½″ piece of aluminum will be used for glass stops on the outside. Entrance doors to the various stores will be solid core wood covered with ⅜″ oak flooring boards, both inside and out, and will act as sign boards for each shop.

Heating and air-conditioning

There will be a central oil fired boiler which will supply hot water to three air supply units on the roof. These air supply units will in turn supply air by duct work on the roof to a plenum formed by the inverted side of each paraboloid shape. Each plenum will in turn supply hot air to the interior of the building through twenty-four 6″ holes in each paraboloid shape. In the cooling cycle the air cooled condenser units are also located on the roof, and cold air will be piped through the same ductwork. All mechanical equipment is on the roof exposed to the outside, but none will be visible from the retail area. The boiler is located in a small one-story boiler room in the back of the men's shop. An 18″ metal stack is to be free standing in the back of the building. Each hyperbolic paraboloid will be drained individually through a 3″ copper rain leader in the center of each column. These will in turn hook up to a dry well as there is no storm sewer in the area. All plumbing wastes will be handled through a septic system as there is no sanitary sewer in the area.



CENTER SCHEME AND FLOOR PLAN

Electrical

Electric power will be supplied by underground service to the back of the building and metered individually for each store. It will be supplied to an 800 amp four-pole socket neutral 250 volt fused main switch. Lighting will consist of a 13′ square made up of eight special five-lamp 6′ fixtures. One lamp per fixture will be used for up lighting; the other four will be down lights. There will be one square per column which will be fed by a small conduit up each column and up into the shell. In addition, show window lighting will be obtained by incandescent spots recessed into the transom above the windows. Foot candle reading at retail sales level will be 62.

Area and cost

Total area under roof is 20,700 square feet; retail space is 15,200 square feet; paved parking area is 53,800 square feet. Total cost including landscaping and paving is $250,000. The project is scheduled to be finished by August 1, 1961.

MORE BEAUTY IN OUTDOOR LIGHTING

WRITE FOR CATALOG S-61

STONCO lighting

STONCO ELECTRIC PRODUCTS CO.
333 MONROE AVE., KENILWORTH, N.J.
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Circle 130 for further information

LITERATURE

Literature cited in this department is available from various manufacturers and associations free of charge, except where indicated. To obtain copies, circle the keyed numbers on the reader service cards facing pages 1 and 70.

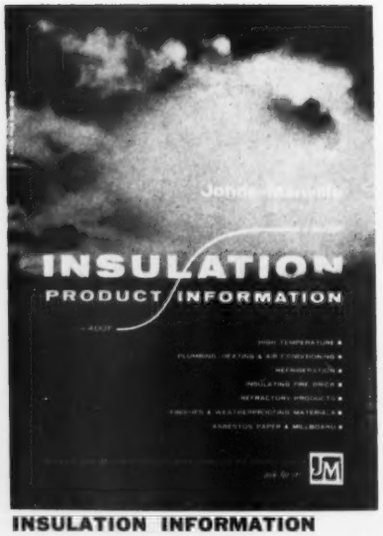
HARDBOARD PRODUCTS

A new insulating board, acoustical and hardboard products booklet is available. This fully illustrated brochure contains complete technical information, specifications, full-color photographs and graphic illustrations on manufacturer's line of structural insulating board, acoustical, roof deck, and hardboard products. Featured in the new brochure are application details with photographs, cross-section architectural line drawings and comprehensive explanations. Typical installation methods and closeups of the products are also offered. (28 pp.)

AIA FILE NO. 19-D

MFR: SIMPSON TIMBER CO.

Circle 300



INSULATION INFORMATION

Thermal insulations for all types of commercial and industrial requirements, in applications ranging from −400° to 3000° F, are completely described in a newly revised booklet, designated *IN-244A*. Contains six sections, each devoted to a specialized group of company's *Thermal* insulations. Information on each product consists of an application photo, description, available forms or types, advantages to users, and detailed specification data, including compliance with government specifications and other standards. Type of insulation and its temperature limit are displayed for each product, to facilitate rapid location of pertinent data. (64 pp.)

AIA FILE NO. 37-D

MFR: JOHNS-MANVILLE CORP.

Circle 301

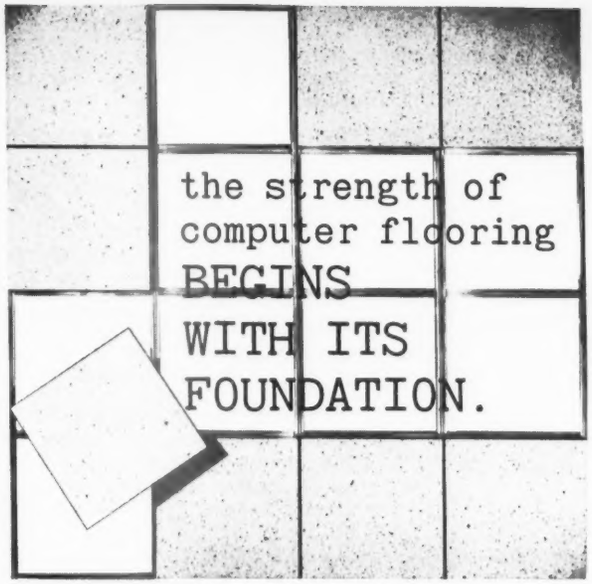
ASBESTOS-CEMENT PANELS

An architectural, engineering and data manual on asbestos-cement panels for interior-exterior use, has been announced. Containing both application information and design data for asbestos-cement panels, the manual covers uses such as curtainwall applications with both asbestos-cement and aluminum batten systems, roof deck and window wall construction, and interior partitions with aluminum and steel batten systems, wood framing and standard mouldings. Manual also includes suggested specifications. (28 pp.)

AIA FILE NO. 19-D

MFR: NATIONAL GYPSUM CO.

Circle 302



Underneath ELAFLOR'S aluminum or steel core panels, stands a *rigid grid system*, which provides unexcelled lateral strength at all floor heights. This system permits panels to be interchanged and cut-outs to be added or moved freely without the expense and trouble of releveling or extensive modification. Cable cut-outs, etc., can be made with complete flexibility . . . any size, any angle, any place . . . without decreasing load capacity or inducing side sway.

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GLEN BURNIE, MARYLAND

Canadian Rep.—Cameron Windows (Aluminum) Ltd., 142 Kennedy Rd. S., Brampton, Ontario

Circle 131 for further information

LITERATURE

LIGHTING

LUMINOUS CEILING

Brochure details new walnut wood-beam ceiling, modular suspension system. Ceilings combine natural properties of wood with a great variety of decorative luminous and louvred ceiling panels. As explained in the brochure, the product is available as a total luminous ceiling or interspersed with acoustic tile and fluorescent or incandescent fixtures.
AIA FILE NO. 31-F-231
MFR: NEO-RAY PRODUCTS, INC.
Circle 303

LIGHTING WITH PLASTICS

Plastics for Lighting is of value to anyone considering the purchase or specification of lighting fixtures with plastic lenses. Brochure tabularizes 16 properties of acrylic, polystyrene and vinyl plastics as determined during investigations made by the company in evaluating plastics for lenses of its luminaires. Seven of these properties are discussed in detail and six supplementary illustrations visually portray information covered in the text. (5 pp.)
AIA FILE NO. 31-F-2
MFR: HOLOPHANE CO., INC.
Circle 304

HOSPITAL LIGHTING GUIDE

Recommended lighting levels for 112 specific areas in the modern hospital are incorporated in a new manual recently published. Called the *Hospital Lighting Manual*, the booklet also contains illustrations of well designed hospital lighting installations, a breakdown of the various types of lighting equipment available and suggested lighting layouts. Every conceivable hospital area is covered, including those which come under patient care, public and traffic, administrative and service. Manual is considered one of the most comprehensive published on the subject of hospital lighting.
AIA FILE NO. 31-F-1
MFR: DAY-BRITE LIGHTING, INC.
Circle 305

OFFICE LIGHTING REPORT

A new report entitled, *The Office of the Sixties*, discusses in detail the ten requirements believed necessary

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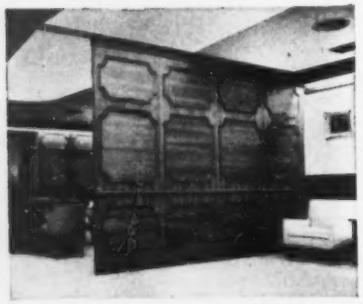

Airwalls installed in the Continental Assurance Company, Chicago, Illinois.

"AIRWALL" Pneumatic Partitions offer architects a completely new concept of design flexibility for interior walls. "AIRWALLS" provide a lightweight, completely portable wall that can be used anywhere to divide floor areas into useable rooms. No floor or ceiling tracks are required . . . "AIRWALLS" can be shifted at will . . . in a matter of minutes. Each panel is set in place and the Airseal is inflated to lock the panel in position . . . provides a tight seal at floor and ceiling levels. This tight seal plus "AIRWALL's" unique construction provides a sound control never before possible in a portable wall.

Individual panels are 36" wide, heights to 12'...panels are constructed with tongue and groove for rigid, flush installation. Available in a wide variety of facing finishes. Applications are unlimited . . . ideal for Hotels, Restaurants, Offices, Funeral Parlors, Schools, Churches, Motels and Commercial Buildings.

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Circle 133 for further information

LITERATURE

to qualify lighting units for satisfactory illumination for the diverse office tasks of the next decade. These requirements are: esthetic design, high light output, high coefficient of utilization, uniform lighting, comfortable lighting, effective ceiling lighting, long ballast life, high lamp efficiency, easy maintenance, and economical installation. Also included is layout information, graphs, charts and other technical data relating to luminaires most recommended for office lighting applications.
AIA FILE NO. 31-F-23
MFR: HOLOPHANE CO., INC.
Circle 306

FLOODLIGHTS
Booklet discusses the merits of each of the floodlight beam spread models in manufacturer's line. Details base, pole or bracket mounting recommendations. Suggests commercial and industrial uses in relation to beam spread, styles, reflectors, etc. Gives detailed graph analysis of lamps meeting the standards of the National Electrical Manufacturer's Assn. (4 pp.)
AIA FILE NO. 31-F-22
MFR: APPLETON ELECTRIC CO.
Circle 307

LIGHTING FIXTURES
A new series of incandescent lighting fixtures, designed along classically simple lines, is announced in a new brochure published by the manufacturer. Brochure covers fixtures in this new line which include incandescent recessed squares, darklites, baffled downlites, *Alzak* downlites, adjustable accent lights and recessed round regressed lens lights. Discussion of product line includes how item's recessed units are built to fit into the ceiling and become an integral part of it.
AIA FILE NO. 31-F-23
MFR: LITECRAFT MANUFACTURING CO.
Circle 308

EMERGENCY LIGHTING
How to Select Emergency Lighting gives step-by-step instructions for planning emergency light installations. Booklet explains how to determine the areas in buildings where emergency lighting is needed. Selection of lamp heads best suited for lighting each area is aided by illustrations of the actual light patterns emitted. Locating the lamp heads for greatest efficiency and economy is also explained. A complete section is devoted to selecting the proper control unit for powering emergency light installations. (16 pp.)
AIA FILE NO. 31-F-26
MFR: CARPENTER MANUFACTURING CO.
Circle 309

LIGHT CONTROLS
Bulletin *L758W-1* discusses company's line of continuously adjustable light control equipment to dim, brighten and blend lighting. Bulletin displays in over 100 pictures and illustrations the different knob controls, effects of dimmers, applications, wiring diagrams, types and characters of controls, installations, wall plate colors, and ratings for both incandescent and fluorescent lighting control. A complete price list is included. (24 pp.)
AIA FILE NO. 31-F-25
MFR: SUPERIOR ELECTRIC CO.
Circle 310

LIGHTING SHIELDS
Lighting Shields Made From 'Monocite' Methacrylate Monomer, tells how such shields and panels can be used by architects and lighting engineers to light for mood, area size or type of work to be performed. In addition, the brochure lists the typical properties of sheets cast from *Monocite* and presents examples of the use of these sheets. Photographs aid in discussion of applications. (6 pp.)
AIA FILE NO. 31-F-24
MFR: E. I. DU PONT DE NEMOURS & CO.
Circle 311

EMERGENCY LIGHTING
The availability of a booklet covering manufacturer's line of emergency lighting equipment has been announced. Booklet provides operating data and prices on entire line of fixtures and details layout and installation information for manufacturer's products. (8 pp.)
AIA FILE NO. 31-F-26
MFR: ELECTRIC CORD CO.
Circle 312

ELECTRICAL

ADJUSTABLE SPEED DRIVES
Two of the manufacturer's models of adjustable speed drives for pumping applications are discussed in a booklet recently published. Application data booklet presents an informative drive selector guide for many industries such as: sewage disposal stations, municipal water treatment stations, constant pressure pumping systems, irrigation systems, pipeline pumping, storm water pumping systems, and industrial processes as found in the chemical and pulp and paper industries. In addition, booklet is illustrated with application diagrams, efficiency curves and mechanical features of both models of adjustable speed drives.
AIA FILE NO. 29-D
MFR: WESTINGHOUSE ELECTRIC CORP.
Circle 313

SWITCHGEAR AND CONTROLS
Generator controls and automatic transfer switches are discussed in a new booklet. Manufacturer also covers the line of company's unified controls, combining generator control circuits, transfer switch, and optional automatic engine control panel and battery charger. Also illustrated is manufacturer's auxiliary controls, including voltage relays and voltage regulators. Newer control equipment highlighted in the booklet includes a breaker operator for remote switching applications, and a control relay for 4 to 20 pole service. Booklet is designated bulletin *1260.*
AIA FILE NO. 31-D-4 AND 31-D-5
MFR: LAKE SHORE ELECTRIC CORP.
Circle 314

CABLE TRACER
Details of an instrument designed to speed the tracing of electrical conductors are available from a publication released recently. Booklet describes two methods by which one man can trace conductors in pipe, conduit and non-metallic sheathed cable in one tenth of the time these jobs normally require. Line drawings show schematically how these two methods are done. Booklet also lists specifications, features and applications. (4 pp.)
AIA FILE NO. 31-C-71
MFR: PYRAMID INSTRUMENT CORP.
Circle 315

MISCELLANY

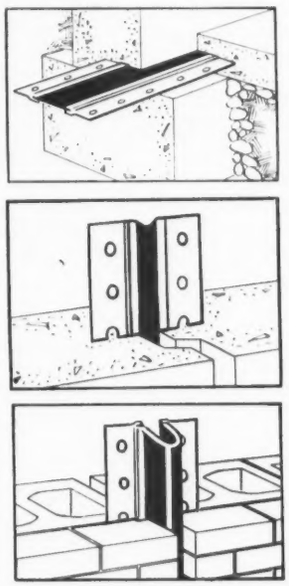
CABINET SHOWERS
A new brochure featuring manufacturer's line of cabinet showers has

Expand-o-flash WATERSTOP

Below grade and above grade, the continuous neoprene and metal edging of Expand-o-flash serves as a complete waterstop.

The metal adheres to the concrete or mortar, and the pliable, impervious neoprene remains constantly flexible.

● When the neoprene is installed with a bulge, Expand-o-flash thoroughly fulfills its purpose as an expansion joint. See us in Sweet's, or write us for further information and sample.



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P&S ROCKER-GLO in

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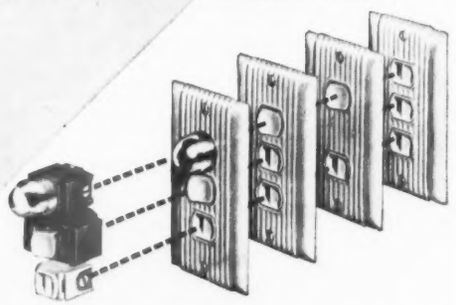

Save space, cut wiring time by installing famous Rocker-Glo in combination with any other P&S-Despard devices. Compact design lets you fit any combination of up to *three* switches, outlets, pilots or night lights in space ordinarily required for one!

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Circle 135 for further information

LITERATURE

been recently published. Six new cabinet shower models, glass and vinyl shower doors, glass shower enclosures and receptors are described in the new publication. Construction recommendations, specifications, and ordering information is included.

AIA FILE NO. 29-H-3

MFR: HENRY WEIS MANUFACTURING CO.

Circle 316

SLIDING DOOR HARDWARE

Literature detailing a new line of low cost, reversible sliding door hardware is now available. All specifications on the reversible, by-passing hardware are given, and hardware sets are illustrated, including elevations for ¾" and 1⅜" doors. Ordering data covers door dimensions for 2'0", 2'6", 3'0" and 4'0" openings, packaging for individual tubes or bulk shipping weights.

AIA FILE NO. 27-A

MFR: GRANT PULLEY & HARDWARE CORP.

Circle 317

CONTROL BOARD

Literature illustrates uses and versatility of control and scheduling board in laying out columns, title headings, rapid rearrangements, quick corrections along with standard board variations and optional supplies and accessories. Displays various suggestions for use and applications. Highlight of the booklet shows how user may lay-out or customize the control board to suit particular needs. (12 pp.)

AIA FILE NO. 24-C

MFR: MEMO FLEX DIVISION

Circle 318

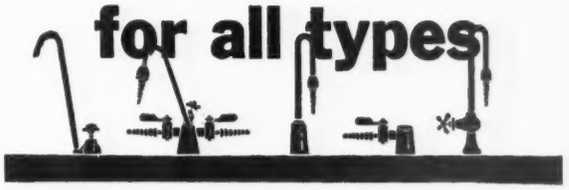
HVAC

AIR CONDITIONING CONTROLS

A new bulletin describing and illustrating manufacturer's dual-purpose all-year air conditioning control valves has just been issued. Folder explains how these self-contained thermostatic selector valves, designed for specific application to all-year air conditioning systems utilizing hot or cold water as a heat transfer medium with a single supply line and a single return line, eliminates the need for pneumatic lines or electrical connections. Other major advantages and features are also cited. In addition, specifications on both direct and remote actuator types available are listed. Heating cycle and cooling cycle operations are illustrated by cross-sectional schematic diagrams as well. Also presented is brief data covering single-

ON TOP

for all types



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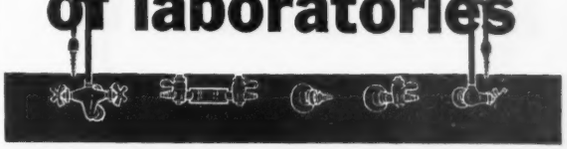

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No matter what the specifications, LAB-FLO has the exact selection of quality-built service fixtures you need – for every piece of equipment in the laboratory. LAB-FLO has won the coveted APPROVED stamp of the nation's most discriminating architects and engineers – men who know quality and performance best. LAB-FLO justifies this professional confidence in many major industrial, commercial and educational installations...where strict standards and specifications must be met. For your next laboratory plan, insist on top-rated, advanced design LAB-FLO and you will be sure of the finest.

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Circle 137 for further information

LITERATURE

purpose controls, a handy quick-reference selection chart, and other components and accessories.
AIA FILE NO. 30-E
MFR: AMERICAN-STANDARD CONTROL DIV.
Circle 319

WALL-MOUNTED GAS BOILER

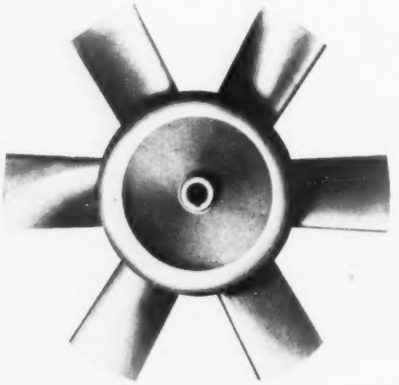
Brochure gives manufacturer's analysis of a new wall-mounted gas boiler for hydronic home heating. Describes how the light-weight gas boiler mounts on the wall, allowing greater freedom of design, helps cut costs and time of installation. Brochure details how the gas boiler is fully A. G. A. approved at 120,000 BTU's Natural Gas and 112,000 BTU's LP Gas, and how the design of the boiler is efficient enough to take care of any basic housing including rambling ranch or split level homes. Also detailed are applications with baseboard convector panels, baseboard radiant panels, radiator hot water heating and radiant concrete floor slab or plaster ceiling.
AIA FILE NO. 30-C-1
MFR: ASCOT GAS WATER HEATERS, INC.
Circle 320

ELECTRIC HEATING

Manufacturer's line of electric comfort heating equipment is treated in complete and concise fashion in a new bulletin designated *975-D*. Applications and product information are included for help in solving residential, commercial and industrial comfort heating problems. Each equipment item is covered with explanatory text, illustrations, dimensions, engineering and application data. Products covered in the new bulletin are: baseboard heaters, forced air wall insert heaters, radiant heaters, floor drop-in types, cabinet convectors, snow melting mats, unit ventilators, console unit heaters, unit heaters, industrial blower units, spot heaters, airduct heaters and many types of controls. (16 pp.)
AIA FILE NO. 31-K-3
MFR: EDWIN L. WIEGAND CO.
Circle 321

ROOF VENTILATOR

Designated bulletin *4104*, manual describes manufacturer's new direct drive centrifugal roof ventilator. Bulletin discusses and illustrates specific design features and operating characteristics of the new ventilators. Selection and rating tables indicate relative quietness ratings, motor horsepowers, fan speeds, and fan deliveries for different static pressure conditions. Simplified installation type drawings are correlated with tabular data to provide important dimensions for use in engineering and architectural layouts. A hypothetical set of typical specifications is also provided in the new bulletin. (8 pp.)
AIA FILE NO. 30-D-1
MFR: AMERICAN-STANDARD INDUSTRIAL DIV.
Circle 322



AXIAL-FLOW FANS

Axial-flow fans for heating, cooling, ventilating, fume removal, and drying systems, are described in a new illustrated bulletin recently released. Fans with direct-connected motors and designs with V-belt drive are covered. Features, construction details, optional equipment, specifications, and tables of capacities and dimensions are included in the new bulletin designated *AFF-61*. Discussions of the aerodynamics of the blades and performance curves of typical fans are included along with graph illustrations displaying horsepower and static pressure in relation to the units of air pressure delivered. (15 pp.)
AIA FILE NO. 30-D-1
MFR: L. J. WING MANUFACTURING CO.
Circle 323

AIR DISTRIBUTION EQUIPMENT

Manufacturer is offering a condensed manual of air distribution equipment to architects, engineers, contractors, and users of engineered air distribution equipment. Booklet allows designers of air distribution systems to quickly survey the range of equipment designs, sizes, finishes, and applications available from the manufacturer. Included in this manual is information on new continuous line extruded aluminum ceiling diffusers and modifications to continuous line diffusers. (8 pp.)
AIA FILE NO. 30-J
MFR: BARBER-COLEMAN CO.
Circle 324

INDUSTRIAL HEATERS

Brochure providing complete information on manufacturer's combination oil-gas line of industrial heaters has just been published. Publication contains descriptions, technical data, and application photos of the various sizes in which the unit is available. Blower performance charts are included for each of the units from 280,000 BTU/H to 1,000,000 BTU/H. Other tables provide dimensional data, air handling capacities, heater exchanger area, motor horsepowers, additive cooling capacities, and plumbing data. One page of the brochure is devoted to diagrams showing the various arrangements possible when auxiliary equipment is added. (12 pp.)
AIA FILE NO. 30-B-1
MFR: LENNOX INDUSTRIES, INC.
Circle 325

AIR COOLED CONDENSER

Bulletin *VC 103* describes a remote air-cooled condenser with coils arranged in a V-shape so that air is drawn through them and discharged vertically upwards by the propeller fans. This arrangement, the manufacturer says, provides a low silhouette in a minimum of

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world's finest shower head
- Adjustable spray
- 6 sizes and models
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- Fits old and new showers
- Vandal proof when specified

Featuring AUTOFLO® the integral flow control that saves money from the first shower.

AUTOFLO reduces water consumption, saves hot water, cuts fuel cost, stretches hot water supplies and reduces overhead on waste disposal and septic system.

Here's why you save money with AUTOFLO

	ORDINARY SHOWER HEAD	ANYSTREAM WITH AUTOFLO WATER SAVER
Water Delivery Per Minute @ 50 lbs. pressure	8 Gallons (More than needed)	4½ Gallons (Adequate for shower)
Average Shower Time	5 Minutes	5 Minutes
Total Water Used	40 Gallons	22½ Gallons

AUTOFLO cuts water waste almost 50%

Get details—write Dept. AN for catalog S-92-B

SPEAKMAN COMPANY WILMINGTON 99, DELAWARE

In Canada write CUTHBERT-SPEAKMAN, MONTREAL 3, CANADA

Circle 138 for further information

Specify The Best!

Give your client the

JEFFREY GARBRIDDER®

Food and Paper Waste Disposers Specifically Designed for:

- SUPERMARKETS
- DRIVE-INS
- RESTAURANTS
- HOTELS
- HOSPITALS
- INSTITUTIONS

Dishtable under-counter unit illustrated.

Free Standing Central Stations also available.

Wherever food is served

Available in 2, 3, or 5 HP Models

There is a specific Jeffrey GARB-*RIDDER* to solve any food waste problems. Each unit is precision constructed for efficient, economical food waste disposal and long, trouble-free service. Write, wire or phone TODAY for descriptive brochure and dimensional Installation Drawing.

See us at the National Restaurant Show May 22-25 in Chicago BOOTH #811

See **LIVE SUPERMARKET DEMONSTRATION** at S. M. I. CONVENTION, MAY 7-10, CHICAGO, BOOTH 117.

The Pioneer in Commercial Food Waste Disposers

MANUFACTURED FOR OVER 50 YEARS

UNITED MANAGEMENT CORPORATION

EXCLUSIVE NATIONAL DISTRIBUTOR

1201 CHASE AVENUE • CHICAGO 26, ILLINOIS

Telephone ROgers Park 4-1729

Circle 139 for further information

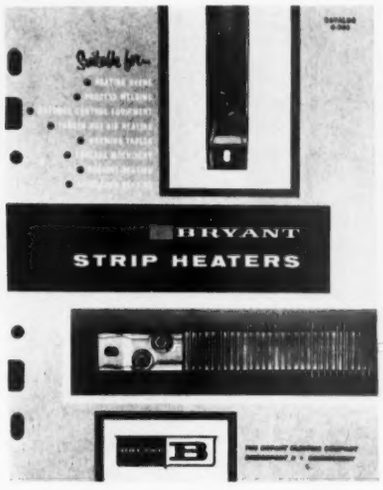
LITERATURE

floor space. Complete dimensions, specifications and other pertinent information is contained in the brochure. Capacities range from 3 to 10 tons.

AIA FILE NO. 30-F-3

MFR: HALSTEAD AND MITCHELL CO.

Circle 326



STRIP HEATERS

Full descriptions, illustrations, and selection procedures for its line of general purpose and finned-type strip heaters are offered in a new brochure designated *C-300*, by the manufacturer. Brochure supplies high and low temperature ratings, wattages, voltages and dimensions for units with both terminals at one end and for those with one terminal at each end. Factors to be considered in the selection of strip heaters are broken down according to all possible applications, and complete selection examples are given for a variety of representative uses. Of special value is a series of tables giving average specific heats, as well as other pertinent physical characteristics, of various common solids, liquids, gases, and vapors. Graphs are used where apropos. Illustrative material consists of photographs, drawings and diagrams giving complete dimensions. (12 pp.)

AIA FILE NO. 30-C-14

MFR: BRYANT ELECTRIC CO.

Circle 327

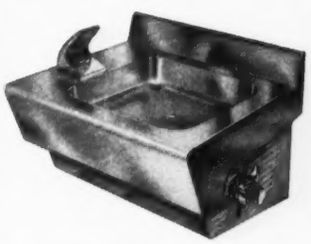
HEAT LOSS GUIDE

Step-by-step instructions for determining room-by-room residential heat loss, sizing the boiler and selecting the radiation are offered. A typical example is presented to aid in understanding the method. A complete *Table of Residential Heat Loss Factors* for walls, ceilings, floors and infiltration is included; as well as a

DRINKING FOUNDATIONS

The durability and beauty of JUST Stainless Steel Drinking Fountains and Sinks make them ideal for Schools, Hospitals, Stores and Commercial, Institutional and Public Buildings of all types . . . their clean, modern lines harmonize with the concepts of modern architecture.

MODEL B-22288 FULLY RECESSED . . . SINGLE BUBBLER



MODEL B-22330 WALL HUNG . . . SINGLE BUBBLER

MODEL B-22636 CUSPIDOR . . . FULLY RECESSED

WRITE TODAY FOR BULLETIN J-131

NAME_____

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ADDRESS_____

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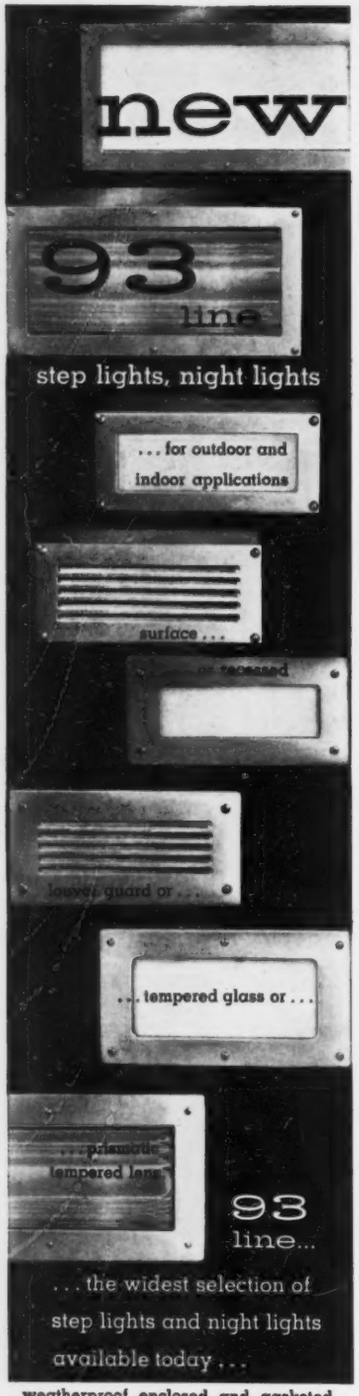
Just Line JL

Just Manufacturing Co

9233 KING AVENUE

FRANKLIN PARK, ILL.

Circle 140 for further information


new
93 line
step lights, night lights
... for outdoor and indoor applications
surface ...
louver guard or ...
... tempered glass or ...
... prismatic tempered lens
93 line...
... the widest selection of step lights and night lights available today ...

weatherproof enclosed and gasketed ... incandescent or fluorescent ... all cast aluminum everlasting construction ... flawless satin aluminum anodized for permanence ... louver guard or white tempered glass or prismatic lens diffuser available in 3 different sizes.

Ask for complete specification data sheets Section A pages 31/32/33/34.

mc Philben
LIGHTING
1329 Willoughby Ave. Brooklyn 37, N. Y.

Circle 141 for further information

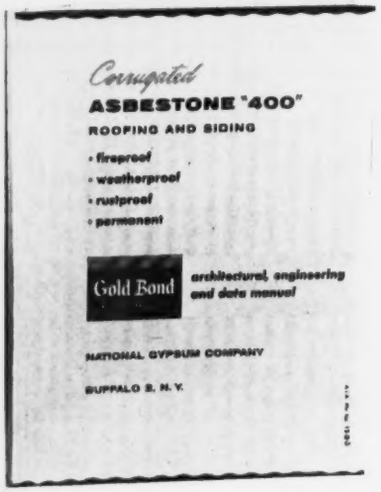
LITERATURE

Table of Heat Losses in BTU/hr. based on 70° temperature difference. A *Table of Conversion Factors* makes it possible to determine heat loss for any temperature difference from 20° to 110° F.
AIA FILE NO. 30-A
MFR: HYDRONIC FITTER'S GUIDE, CRANE CO.
Circle 328

HOT WATER TANK HEATERS

Bulletin *602* displays manufacturer's complete line of hot water storage tank heaters. Bulletin describes the complete line of manufacturer's tanks as well as the full range of heating elements for these tanks. All type applications are described including piping diagrams. Catalog is thumb-tabbed and color-coded for quick, easy reference. (16 pp.)
AIA FILE NO. 29-D-2
MFR: OLD DOMINION IRON & STEEL CORP.
Circle 329

ASBESTOS/ASPHALT



ROOFING AND SIDING

An up-to-date architectural, engineering and data manual on manufacturer's line of corrugated roofing and siding has been announced. Manual covers construction and application techniques, details of supplementary assemblies, and data on ultimate load versus span, compressive strength, and hardness and density of the corrugated sheeting. Ready methods for determining the products and accessories needed for a particular application are also included. All necessary and pertinent information on fireproof, weatherproof and rustproof permanent roofing and siding is contained in this manual. (39 pp.)
AIA FILE NO. 12-B-3
MFR: NATIONAL GYPSUM CO.
Circle 330

WATER MAINS PRESSURE PIPE

Newly published brochure describes and enumerates the qualities of manufacturer's pressure pipe for use in water mains. Designated *TR-160A*, the brochure contains tabular data giving the sizes and weights of the asbestos-cement pressure pipe in the three available classes, 100, 150 and 200, including the weights of couplings for each. In addition, through photographs, drawings and text, engineering personnel and those concerned with specifying and installing pressure pipe are acquainted with the methods of manufacture, quality control, installation and assembly of the pipe. (8 pp.)
AIA FILE NO. 29-B-61
MFR: JOHNS-MANVILLE INTERNATIONAL CORP.
Circle 331

ASBESTOS/ASPHALT CURBING

Bulletin *AFD-18A* covers the application of asbestos fiber to asphalt curbing. Bulletin incorporates a suggested design mix presently being used for curbings containing asbestos fiber. A table of both sand and total gradations for the suggested mix is included.
AIA FILE NO. 12-A-1
MFR: JOHNS-MANVILLE INTERNATIONAL CORP.
Circle 332

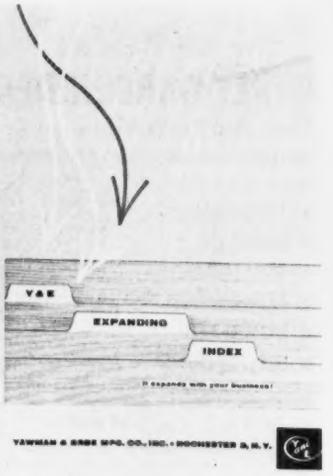
CEILING SYSTEMS

Brochure *C-600* covers the multi-use properties of machine-applied, asbestos fiber products as manufactured by company. UL test information and applications for fireproofing of cellular desks, beams and columns are also covered. Three-hour test information and sound attenuation properties for company's acoustical ceiling systems are discussed in detail with typical job photographs. Complete architectural specifications are also included. (8 pp.)
AIA FILE NO. 39-B
MFR: COLUMBIA ACOUSTICS AND FIREPROOFING CO.
Circle 333

OFFICE AIDS

DRAFTING PROCESSES

One hundred often asked questions about reproduction and drafting processes and materials are answered in a new brochure. Literature provides data on company's miniaturization equipment, drafting film, diazo materials and polyester films as well. A general information section explores—in question-answer sequence—the outstanding characteristic of polyester film and its history. Subjects covered include the types of viewing equipment available for 105 mm and 35 mm negatives; the main function of an engineering miniaturization system; what the "washable tracing" technique is, diazo coatings available on polyester film base; and the effect of humidity or moisture on diazo papers. (6 pp.)
AIA FILE NO. 35-H-31
MFR: KEUFFEL AND ESSER CO.
Circle 334



CARD FILING SYSTEM

Brochure in full color describing card filing systems that expand with a business. The index, an open notation system, is pictured with detailed instructions for efficient, accurate use. Also included are rules and charts for determining the size of indexing needed, the functions of the component parts and a list of types of companies and organizations where effi-

Circle 142 for further information about NORTON DOOR→

Doctors Dining Room, Christ Community Hospital, Oak Lawn, Illinois

Another Norton® First!

Wood-Covered Door Closers

Choice of more than 73 beautifully grained actual woods to match wood doors and room panelling.

Norton announces another first—wood-covered door closers for complete *Architectural Compatibility*. A rack-and-pinion narrow projection door closer for surface mounting with a lamination of wood (Flexwood*) permanently bonded to the cover.

Now you can provide door closers covered with the same type of wood as the door and room panelling. The wood is furnished natural and can be finished on the job to assure a perfect match between door and closer.

Norton's Series 7000W is available from stock in the six most popular woods used in doors and room panelling (shown above). You can also specify Norton closers covered with 67 other exotic and native woods on special order, almost any wood growing on the face of the earth.

NORTON DOOR CLOSERS, 372 MEYER ROAD • BENSENVILLE, ILLINOIS

*Registered Trademark—U.S. Plywood Corp.

Norton Series 7000 Closers
provide **The Custom Look** for every door

Norton's Series 7000W covered with cherrywood to match the wood of the door and room panelling.

Christ Community Hospital, Oak Lawn, Illinois
Architect: Burnham & Hammond, Chicago, Illinois
General Contractor: Wm. E. Schweitzer & Co., Evanston, Illinois
Distributor: Clark & Barlow Hardware Co., Chicago, Illinois

Metal or wood covered to contrast or match room decor

•

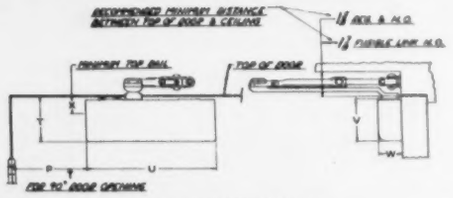
Narrow • compact • sturdy surface mounted closers for interior and exterior wood or metal doors

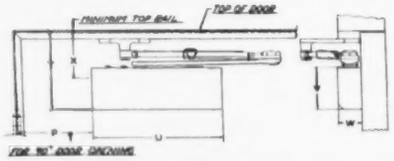
APPLICATION: Only Norton's Series 7000 assures you of a perfect match between door and closer throughout your entire building. Norton's 7000 Series door closers are ideally suited for any *wood* or *metal door* where complete architectural compatibility is a requirement. Norton's Series 7000 door closers assure you of beautiful installations that compliment their surroundings.

Metal Doors: Series 7000 is available with metal covers sprayed to match or contrast with the finish of metal doors. Also available chrome plated to match other door hardware.

Wood Doors: Series 7000W is available covered with almost any wood that grows on the face of the earth. Natural wood to be finished on the job with the wood of the doors and room panelling.

SPECIFICATION: Closers for____interior and/or exterior doors shall be full rack-and-pinion type with aluminum case or shell. Closers will be surface-mounted and shall project less than 2 inches from the door. Hydraulic liquid shall be non-gumming and non-freezing. Closers shall be equipped with two key-operated regulating valves for individual control of closing and latching speeds. Regulating valves shall be accessible from the top of closer only and shall be completely unobtrusive. Closers shall be enclosed in a steel cover (with a lamination of____wood bonded to its exterior surface). Successful bidder is requested to have a factory representative inspect and properly adjust each closer at completion of job. Closers shall be Norton Series No. 7000 (7000W) or P-7000 (P-7000W) or equivalent.





SERIES No. 7000 REGULAR ARM*

MAX. DOOR SIZE WOOD OR METAL			CATALOG NUMBER OF CLOSER RECOMMENDED*			P	T	U	V	W	X	APPROX. SHIPPING WEIGHT (LBS.)
	EXTERIOR											
INTERIOR	IN-SWING	OUT-SWING	REGULAR ARM	90° TO 150° REG. H.A.	90° TO 135° REG. F.L.H.A.							
2'-6"			7002	7002-H	7002-FL	6⅛	3	8⅛	2¼	1⅛	1	6
3'-0"			7003	7003-H	7003-FL	6⅛	3	8⅛	2¼	1⅛	1	6
3'-6"	2'-2"	2'-6"	7003-M	7003-MH	7003-MFL	6⅛	3 11/16	13⅛	3¼	1 11/16	1¼	8
4'-0"	2'-8"	3'-0"	7004	7004-H	7004-FL	6⅛	3 11/16	13⅛	3¼	1 11/16	1¼	8½
4'-6"	3'-2"	3'-6"	7005	7005-H	7005-FL	6⅛	3 11/16	13⅛	3¼	1 11/16	1¼	8½

SERIES No. P-7000 PARALLEL ARM*

MAX. DOOR SIZE WOOD OR METAL			CATALOG NUMBER OF CLOSER RECOMMENDED*			P	T	U	V	W	X	APPROX. SHIPPING WEIGHT (LBS.)
	EXTERIOR											
INTERIOR	IN-SWING	OUT-SWING	PARALLEL ARM	90° TO 180° PAR. H.A.	90° TO 180° PAR. F.L.H.A.							
2'-6"			P-7002	P-7002-H	P-7002-FL	7⅛	5⅛	8⅛	2¼	1⅛	3	6
2'-8"			P-7003	P-7003-H	P-7003-FL	7⅛	5⅛	8⅛	2¼	1⅛	3	6
3'-0"	2'-2"	2'-4"	P-7003-M	P-7003-MH	P-7003-MFL	5⅛	5⅛	13⅛	3¼	1 11/16	3¼	8
3'-6"	2'-6"	2'-8"	P-7004	P-7004-H	P-7004-FL	5⅛	5⅛	13⅛	3¼	1 11/16	3¼	8½
4'-0"	2'-8"	3'-0"	P-7005	P-7005-H	P-7005-FL	5⅛	5⅛	13⅛	3¼	1 11/16	3¼	8½

*Add suffix "W" for wood covered closers.

To see samples and get
complete details contact your **AUTHORIZED NORTON REPRESENTATIVE** or write direct

ARIZONA, Phoenix
N. B. Thayer
P. O. Box 3673
7215 N. First Place
ALpine 8-2693

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Los Angeles 26
W. H. Steele Company
1612 W. Beverly Blvd.
MAdison 4-3244

CALIFORNIA,
San Francisco 3
A. D. Troyer
Norton Pacific Sales Co.
681 Harrison St.
EXbrook 2-5663

COLORADO, Denver 3
Architectural Hdw. Sales Co.
1657 Pearl St., AL 5-7694

FLORIDA, Sarasota
E. B. Taylor
878 Siesta Drive
WAbash 7-4050

GEORGIA, Vienna
W. C. Fokes
c/o Roy C. Joiner Co., 4831

ILLINOIS, Chicago 26
K. L. Kaericher
1205 W. Sherwin Ave.
SHeldrake 3-6035

ILLINOIS, Chicago 40
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c/o Windale Hotel
6019 Winthrop Ave.
LOngbeach 1-2840

INDIANA, Evansville 14
Clay W. Gudgel
P.O. Box 2148, Station D
GReenleaf 6-3451

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8349 Joy Road
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7808 Conwell Road
AD 3-4316

TEXAS, Dallas 19
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LAkeside 5955

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MOnroe 7-2133

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ADams 4-2442

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401 Elliott, West
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AIA FILE NO. 27B

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Tear out along Perforation

cient card filing is particularly important. (10 pp.)
AIA FILE NO. 35-H-42
MFR: YAWMAN & ERBE MFG. CO., INC.
Circle 335

VISUAL PLANNING KIT

A kit containing material for planning a graphic visual control is available. Package of visual aid information has many suggestions for picturing facts graphically for production, scheduling, inventory, sales, maintenance and other applications. A collection of 25 tested ideas for tailoring a system to individual requirements is presented in a new brochure. Each idea is illustrated with suggested applications. A booklet serves as manual and catalog. Over 100 illustrations are used to help explain the system and to picture some typical uses. A plan sheet is furnished for plotting a system on paper. Provision is made for determining flow of information, size and type of cards, and color. The same strip of cards can be used to determine the best visible method of posting data on the board.
AIA FILE NO. 35-N-3
MFR: GRAPHIC SYSTEMS
Circle 336

PLAYGROUND PLANNING

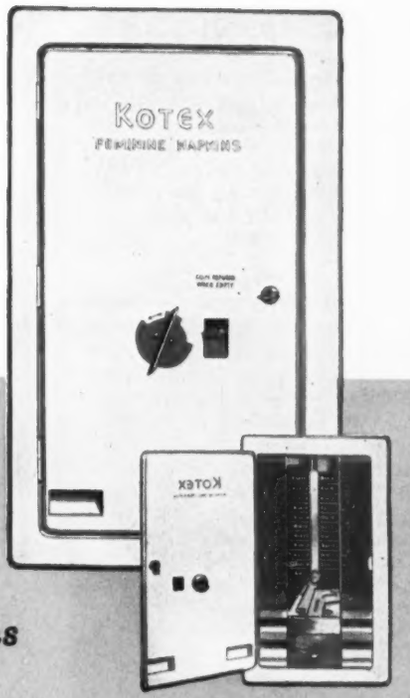
A portfolio for professional landscape designers and architects on planning of playspaces and playgrounds is available. Included in the portfolio are a 32-page sketchbook of play settings, 48 specification sheets and installation scale drawings, a 32-page catalog of playground equipment and street furnishings, all in a AIA envelope file. Portfolio provides designers with all the paraphernalia for developing sculptural playground settings. Equipment is manufactured of colored concrete, fiber glass and galvanized steel.
AIA FILE NO. 35-F-5
MFR: CREATIVE PLAYTHINGS, INC.
Circle 337

DESIGN MODELS

The why's and how's of using scale models as an engineering tool are outlined from preliminary design through construction in a new booklet. Booklet describes in detail the benefits and savings that can be realized through building a model before building the actual plant. Shows how industrial models can be used for preliminary studies, basic models, piping designs, construction and personnel training. (5 pp.)
AIA FILE NO. 41
MFR: INDUSTRIAL MODELS, INC.
Circle 338

LAMINATED PLASTIC

A new detailed data file especially designed to fit into conventional file



The ultimate in built-in convenience...

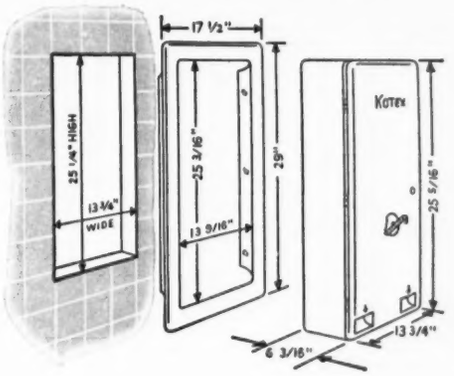
RECESSED VENDORS

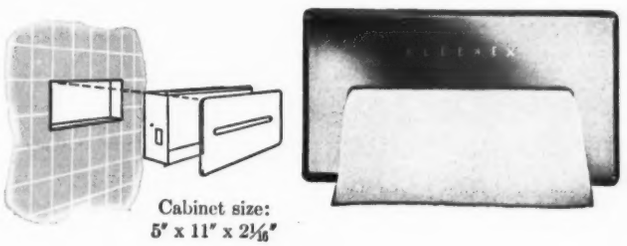
for KOTEX *feminine napkins*

TO KEEP PACE with the latest architectural designs, Kimberly-Clark has styled a brand new recessed dispenser for Kotex feminine napkins for rest room use in schools, offices, stores; industrial and public buildings. This unobtrusive, built-in vendor holds 63 individually boxed napkins. 33 vend from a single loading, 30 are held in storage.

These streamlined, sturdy, pilfer-proof vendors add a much appreciated service to any public building. They are available with either a five-cent or ten-cent coin mechanism.

Available in durable white enamel, satin chrome, gleaming polished chrome and stainless steel. Matching frame for recessed installation. (Other vendors that can be surface mounted are also available.)





Cabinet size:
5" x 11" x 2 1/16"

RECESSED DISPENSER FOR KLEENEX TISSUES

Holds full box of Kleenex 200's. Dispenses one tissue at a time. Mirror-chrome finish. Holes in back and side make it easy to fasten to studding.

For further details on how these attractive new recessed dispensers for Kotex napkins and Kleenex tissues can fit into your plans, see Sweet's Architectural File Cat., Section 27e/Ki. or write to Kimberly-Clark Corp., Dept. AN-51, Neenah, Wisconsin.

KOTEX and KLEENEX are trademarks of KIMBERLY-CLARK CORPORATION

KIMBERLY-CLARK CORPORATION NEENAH, WISCONSIN

Circle 143 for further information

←Circle 142 for further information about NORTON DOOR

LITERATURE

cabinets offers complete laminated plastic surfacing information for commercial, institutional, industrial and residential applications. File includes product information, popular applications, colors and specification data including information on how to match laminated requirements to the desired results. Through this file, architects are provided detailed requirements essential to the effective use of laminated plastic materials.
AIA FILE NO. 35-C-12 AND 23-L
MFR: CONSOWELD CORP.
Circle 339

SURVEYING EQUIPMENT

A recent brochure describing basic builders' instruments and accessory items is now available. Information, including suggested applications and benefits, is included on builders' transit levels and tripods. Other instruments described are leveling rods, plumb bobs, a double right angle prism, steel tape measures, hand levels, scale rules, plastic flagging, slide rules and plan measures. Each instrument described is illustrated.
AIA FILE NO. 35-N-8
MFR: KEUFFEL & ESSER CO.
Circle 340

GLASS

REPORT ON GLASS

A revised edition of *This Is Glass*, a comprehensive story of glass and glass-ceramics, has been published. Heavily-illustrated booklet reviews the history of glass and details basic types of glass. Publication describes role of glass in science, industry, electronics, lighting and home. Booklet includes a section on manufacturer's new glass-ceramic materials and a two-page chart giving properties of selected glasses and glass-ceramics. A chapter on the contribution of glass to art includes illustrations of several famous glass-art pieces. Information is given on the American glass industry and manufacturer's glass center. A preview of the future of glass and glass-ceramics describes research being done. Booklet also lists other literature available from manufacturer covering more specific applications and technical information. (68 pp.)
AIA FILE NO. 26-A
MFR: CORNING GLASS CO.
Circle 341

LAMINATED GLASS

Informative folder describing the methods and materials for installing laminated architectural glass. Folder discusses the applications of laminated architectural glass in the

Nurses' residence and School of Nursing, Sibley Memorial Hospital, Washington, D. C.

Circle 144 for further information

Architect: Justement, Elam, Callmer and Kidd, Washington, D.C.

STYROFOAM® saves on new hospital insulating costs

. . . reduces heat loss through wall by 35%

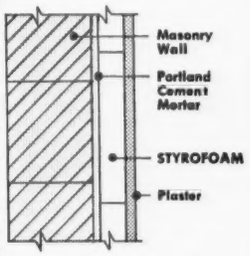
In specifying Styrofoam insulation board for the 350-bed Sibley Memorial Hospital, the Architects provided a three-fold advantage. First, Styrofoam insulation acts as its own vapor barrier, an important factor in areas where high humidity levels must be maintained, such as nurseries and operating rooms. Second, its permanently high insulating efficiency assures keeping even temperatures throughout hospital rooms, thus helping to assure maximum patient comfort.

The third reason was economic. Styrofoam permits savings in construction costs. For example, Styrofoam insulation was used as a "plasterbase," eliminating furring and lathing. In this method, Styrofoam insulation is bonded to the masonry walls using portland cement mortar; plaster is then applied directly to the Styrofoam. This technique often results in a wall insulated at a lower cost than conventionally insulated masonry walls and in some cases at a cost equal to or lower than uninsulated masonry walls.

Construction costs were drastically reduced in building air intake plenums. Because Styrofoam insulation board provides its own horizontal support, external supporting members were done away with. In this application, Styrofoam reduced construction costs by almost half.

At Sibley Memorial Hospital, Styrofoam insulates all external walls of the main structure and of an adjacent dormitory-classroom building. In addition, multiple layers of Styrofoam insulate the hospital's meat freezer and many coolers and refrigerators.

Styrofoam insulation board contains millions of tiny non-interconnecting air cells. It provides a low "K" factor that *stays* low, permanently, because Styrofoam doesn't absorb water. Nor does this chemically engineered insulation rot or mildew. It has no food value to attract vermin. And lightweight Styrofoam is so easy to handle and install—for both cavity wall construction and solid masonry—that installation costs are reduced to a minimum. For more information write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1500JF5.



Styrofoam is a registered trademark of The Dow Chemical Company. It is applied only to the homogeneous expanded polystyrene made according to an exclusive Dow process. Styrofoam brand insulation board is available only from Dow and its authorized representatives.

Other Dow Building Products

ROOFMATE* lightweight insulation for built-up roofs that serves as its own vapor barrier. It provides permanent high resistance to water vapor. Light weight and ease of handling reduce installation time.
*TRADEMARK

SARALOY® 400 flexible roof flashing. Accommodates expansion and contraction. Can be bonded quickly, permanently to most construction materials. Easily conformed to fit building contours.

SARALOY® 200 flexible through-wall flashing and membrane waterproofing. Won't crack or become brittle. Makes long-lasting, waterproof liners for shower pans.

SCORBORD® (Patent applied for) permanent insulation for foundations and perimeters. Pre-scored for easy use. Excellent moisture barrier.

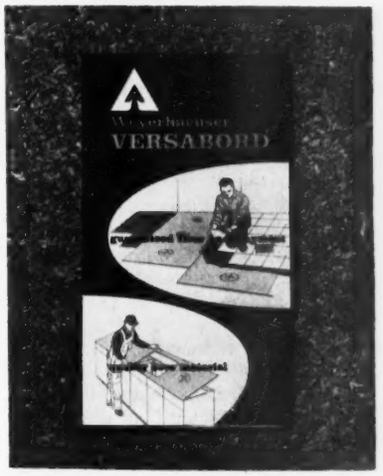
THE DOW CHEMICAL COMPANY DOW Midland, Michigan

Circle 144 for further information

LITERATURE

construction of partitions, room dividers, doors, windows, decorative panels, shower stalls, skylights, curtain walls, railings and spandrels. Further discussion shows how the construction of laminated architectural glass can be varied to control light and solar energy, reduce noise and to produce special decorative effects. (6 pp.)
AIA FILE NO. 26-A-5
MFR: PLASTICS DIV., MONSANTO CHEMICAL CO.
Circle 342

WOOD/HARDBOARD



ALL WOOD PANEL PRODUCT

Booklet designed to carry product story of manufacturer's all wood panel product to the architect, and builder. Literature describes and illustrates the qualities of company's product used as underlayment in floors and counter tops, and as cabinet parts, shelving, closet doors and wall paneling. Also outlined are detailed instructions for installing product in the floor system.
AIA FILE NO. 19-E-6
MFR: SILVATEK DIV., WEYERHAEUSER CO.
Circle 343

WOOD FLOOR EXPANSION

A research project has resulted in data on the control and expansion in hardwood floors. Results show how to control expansion and the kinds of allowances which should be made for expansion. Report includes a map of the United States showing expected changes in average moisture content of wood used indoors between January and July. Also, tables tracing the relation of the equilibrium moisture content of wood to the relative humidity of the surrounding atmosphere at different

LITERATURE

temperatures are included.
AIA FILE NO. 19-E-9
ASSN: MAPLE FLOORING MANUFACTURERS ASSN.
Circle 344

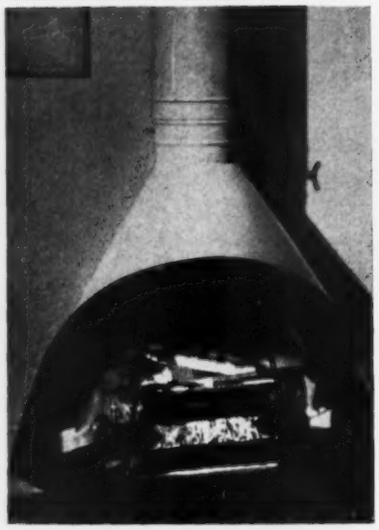
REDWOOD SIDING AND PANELS

Detailed factual information and illustrations on manufacturer's redwood are contained in a new siding and paneling booklet designated *SRMP-029/4859*. Four-color booklet features product information on company's redwood products and paneling. Manufacturer's patterns and dimensions are shown with cross-section architectural line drawings along with tips on applications, finishings and specifications. (4 pp.)
AIA FILE NO. 19-D-2
MFR: SIMPSON TIMBER CO.
Circle 345

UNDERLAYMENT PLYWOOD

Booklet discusses plywood panel designed specifically to meet requirements of homebuilders. Covered in the booklet are merits of the single-purpose product as a foundation material under all resilient flooring, applications, and thicknesses available. Photographs and cross-section architectural line drawings illustrate various application methods and uses: Brochure explains how the underlayment grade plywood is designed specifically for resilient flooring materials.
AIA FILE NO. 19-E-9
ASSN: DOUGLAS FIR PLYWOOD ASSN.
Circle 346

MISCELLANY



FUNCTIONAL FIREPLACES

Folder on company's line of functional fireplaces contains full-color photographs of the fireplace in four actual settings to illustrate unit's adaptability. Displays nine western tones including a spectrum of colors from ebony black to colonial white. Also shown is the *FireHearth Divider Wall* fireplace which can be made an integral part of an expandable room divider. (4 pp.)
AIA FILE NO. 14-E
MFR: CONDON-KING CO., INC.
Circle 347

PRODUCT DEVELOPMENT

Brochure details experience and facilities of a corporation engaged in bringing the techniques of product and market research and development to the fields of civil engineering and construction. Firm is active in developing new products for the construction industry, developing new uses for raw materials and solving complex civil engineering problems. Brochure contains a step-by-step chart and explanation of how the firm works in conjunction with management and other departments of its client companies. One section of the brochure outlines present production and market development opportunities for all possible suppliers to the construction industry. Another section describes civil engineering applications of interest to military, federal, state and municipal authorities as well as industry. Also included is a listing of some of the firm's major study, research and development projects. (12 pp.)
FIRM: CERAND CORP., AFFILIATE OF CLARKESON ENG. CO.
Circle 348

ALUMINUM FOIL BOOKLET

Major manufacturer has recently released a comprehensive booklet on the qualities of aluminum foil in various applications including insulation, electrical, building and the graphic arts. Booklet also covers the manufacturer's research and development of the product. Full-color photographs that visually demonstrated the various properties and advantages of the product are generously scattered throughout the booklet. Essential technical data on aluminum foil and its various laminations are outlined and illustrated. (58 pp.)
AIA FILE NO. 15-J
MFR: ALUMINUM CO. OF AMERICA
Circle 349

NUCLEAR TEST LOOPS

A new brochure is announced, describing a packaged nuclear test loop for use in the nuclear engineering courses of engineering schools. System is designed to enchance the transition from lecture hall theory to practical comprehension by permitting students to swiftly and clearly see experimental results in both steady state and transient conditions of heat transfer, fluid flow, corrosion properties of materials and associated nuclear equipment, the brochure discloses. Also discussed are the customed nuclear test loops which manufacturer's product develops to meet specific developments of companies and laboratories engaged in the design of nuclear reactors. Scaled versions and full-sized test loops for use in cold hydrodynamic studies such as pressure drop, vibration and flow velocity are reviewed.
AIA FILE NO. 35-B
MFR: OMEGA ENGINEERING DIV., ADSON INDUSTRIES, INC.
Circle 350

FOLDING FURNITURE

Booklet describing folding tables, chairs and trucks for institutional use has been released. Booklet provides a full description of each product's physical advantages, dimensions and shipping and handling weights. Architects' specifications are included for the most universally used items—square and pedestal leg oblong folding tables. Brochure also contains a complete technical description of each product's construction features and the materials used, i.e., table top materials, protective trim mouldings and finishes. Included is a section on how to select the right table truck to meet each individual problem. An accompanying price list has also been prepared. (16 pp.)
AIA FILE NO. 28-A-7
MFR: HOWE FOLDING FURNITURE, INC.
Circle 351

SWIMMING POOL IDEAS

Key to the Perfect Swimming Pool is a new brochure indexed and sectionalized for easy reference. The entire brochure uses terms simple enough for the pool novice yet with the kind of technical accuracy demanded by the veteran pool builder. Also available from the manufacturer are equipment check lists for

NEW AIR DUCT MADE ENTIRELY OF GLASS FIBER INSULATION

It's G-B Duct, the round, prefabricated glass fiber duct for residential and commercial heating and air conditioning systems. G-B Duct's uniformly-thick, seamless glass fiber walls reduce heating and cooling costs by cutting heat loss or gain to a minimum. And it soaks up all equipment noises, because every foot of its all-glass-fiber composition contains millions of tiny sound absorbing cells. Costs no more than insulation wrapped metal ducts, because it can be installed in half the time. For additional information write GUSTIN-BACON MFG. CO., 250 W. 10th St., Kansas City, Mo.

Circle 145 for further information

all types of pools. These are detailed sheets which list minimum recommended equipment needed to build a concrete, vinyl, or metal pool.
AIA FILE NO. 35-F-2
MFR: PARAGON SWIMMING POOL COMPANY, INC.
Circle 352

NON-SHRINK MORTAR

The use of non-shrink mortar to achieve better results in a dozen important construction operations highlights a new bulletin designated *E-38*. Operations covered include waterproofing walls and joints, grouting building columns, machinery and anchor bolts, caulking sewer pipe joints, patching defects in concrete, and setting floor brick and quarry tile. They are illustrated in a building cross-section view. All of the illustrations are keyed to the publication supplying detailed data on the use of non-shrink mortar for the particular applications described. (4 pp.)
AIA FILE NO. 3-L
MFR: THE MASTER BUILDERS CO.
Circle 353

EROSION CONTROL

A recently developed method of erosion control, involving use of glass fiber blankets, is described and pictured in a new brochure. Publication describes in detail uses of product in bridge berms, flumes, run-off ditches, and flood control dikes and suggests various other applications. Before-and-after photographs in color, case histories, cost comparisons and complete installation instructions are contained in the booklet. (18 pp.)
AIA FILE NO. 38-L-8
MFR: GUSTIN-BACON MANUFACTURING CO.
Circle 354

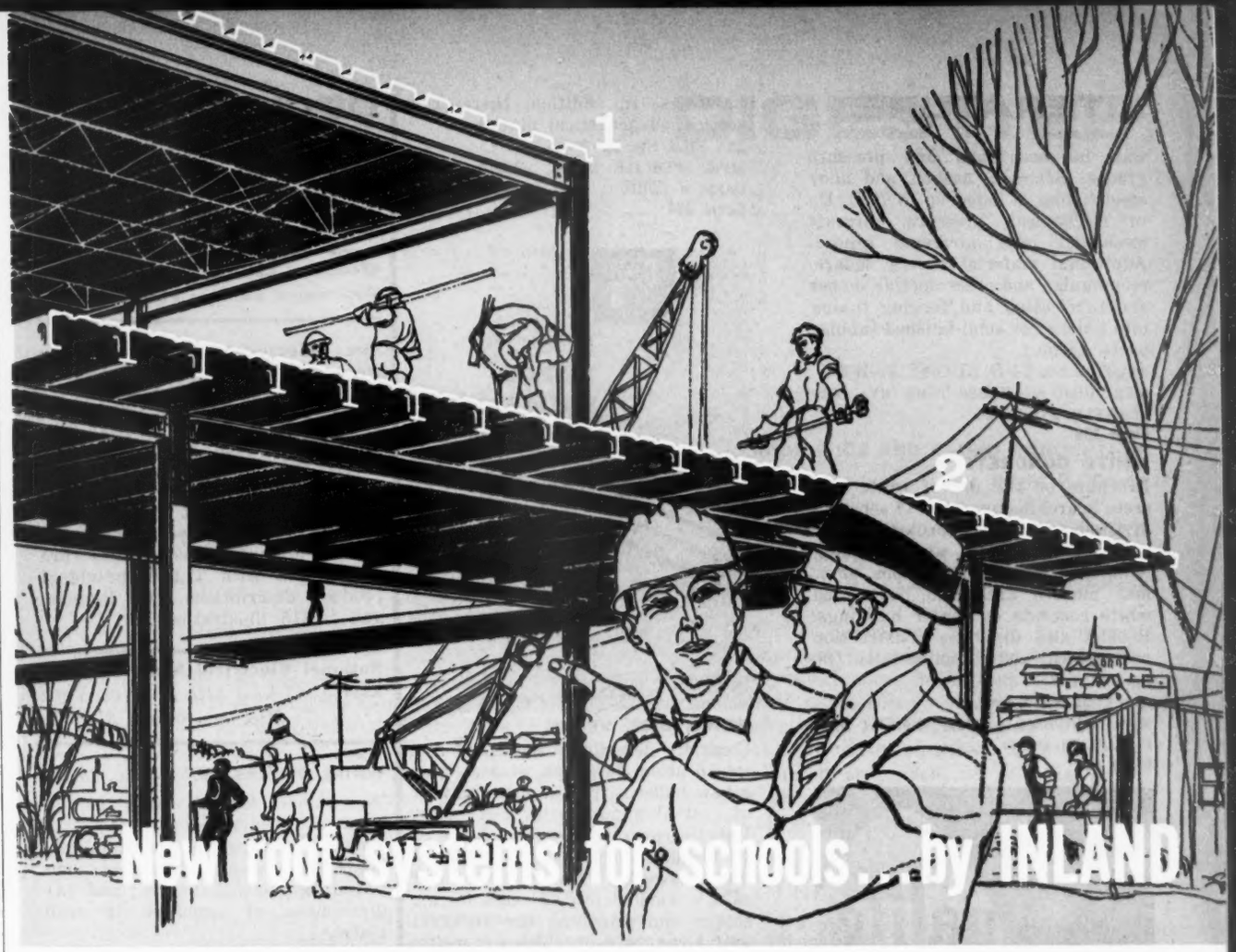
SEWAGE TREATMENT

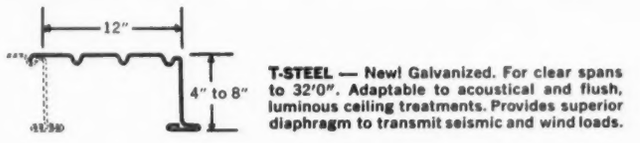
Aerobic digestion sewage treatment systems using the *Hi-Cone Surface Aerator* are detailed in a current bulletin. The catalog features a comprehensive selection guide which correlates oxygenation capacity and HP requirements of the two models most frequently used in sewage treatment plants for 50 homes and up, as well as municipal and medium-to-large commercial, institutional, and industrial installations. (8 pp.)
AIA FILE NO. 29-C-2
MFR: YEOMANS BROTHERS CO.
Circle 355

STEEL TUBING

Booklet describes both seamless and electric welded steel tubing available from manufacturer, including an increased size range. Manufacturer now offers electric welded carbon steel tubing up to 7½" O. D. x .375"

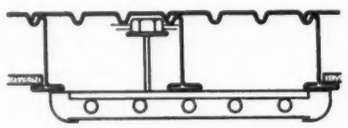
Circle 146 for further information →

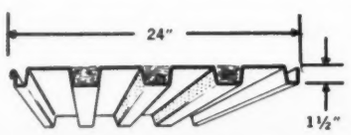




T-STEEL — New! Galvanized. For clear spans to 32'0". Adaptable to acoustical and flush, luminous ceiling treatments. Provides superior diaphragm to transmit seismic and wind loads.

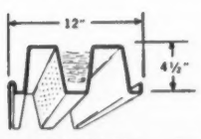
Ceiling Treatments with T-Steel Deck





TYPE B ACOUSTIDECK — For purlin spacings from 6' to 10'. Uses minimum of 1" rigid insulation board.

EP-2A



TYPE C ACOUSTIDECK — For purlin spacings from 10' to 20'. Uses minimum of 1½" rigid insulation board.

Complete structural systems that broaden your latitude in planning ceilings, lighting, acoustics —within realistic budget boundaries

1. Acoustideck for gymnasiums, other activity areas

Combines steel roof deck and acoustical ceiling with Noise Reduction Coefficient of .70.

Erected fast in any weather that a man can work. Interesting ribbed underside provides an attractive ceiling.

2. New Inland T-Steel Roof Deck for clear-ceiling classrooms

Especially suitable over classrooms of 26' to 32' spans —or other areas where you want an attractive unbroken ceiling surface.

You can use various types of acoustical tile — provide a flush, luminous ceiling — or leave the underside exposed and painted.

Write for catalog 248 or see Sweet's, section 2i/Inl. Inland Steel Products Company has trained sales engineers capable of giving you the benefit of their diversified experience on specific problems. Write or call your nearest Inland office.

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LITERATURE

wall in mechanical and pressure grades. Seamless carbon and alloy steel tubing is listed up to 7" O. D., in mechanical, pressure, aircraft mechanical and airframe grades. Additional material covers square, rectangular and other special shapes and fabricating and forging tubing into finished or semi-finished tubular parts. (8 pp.)

AIA FILE NO. 34-D, 31-C-62, 29-B-3

MFR: OHIO SEAMLESS TUBE DIV., COPPERWELD STEEL CO.

Circle 356

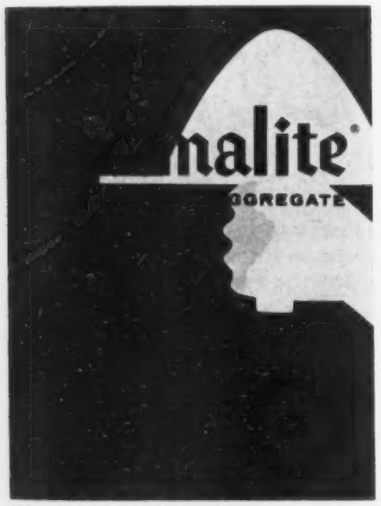
WHITE CONCRETE

Brochure on the use of white concrete in architecture with 17 separate divisions ranging from color and patterns to durability and handling. Numerous color photographs show how modern architects have used white concrete on major buildings. Booklet also discusses construction with typical installation details. (30 pp.)

AIA FILE NO. 4-K-1

MFR: UNIVERSAL ATLAS CEMENT DIV., U. S. STEEL CORP.

Circle 357



PLASTER AGGREGATE

A new bulletin covering the applications of expanded lightweight aggregate in general plastering, fireproofing and curtain wall construction is now available. Text and tables give concise information on various mixes, and the thermal conductivity and sound reduction properties of manufacturer's lightweight aggregate plaster in different applications. Two pages of diagrams and data cover more than 30 fire-rated constructions, together with the fire ratings and the report numbers and authorities. Curtain wall construction is illustrated with wall sections of methods used in four well-known buildings. In addition, there is a section on acoustical plaster.

AIA FILE NO. 21-A-5

MFR: PERLITE DEPT., GREAT LAKES CARBON CORP.

Circle 358

BRICK SIZE VENTS

Complete descriptive data and size specification data are presented in a new bulletin from a manufacturer of cast aluminum brick size vents. Bulletin covers the expanded line of 18 modular sizes, fixed and operating, answering, the manufacturer says, a wide variety of needs for air supply and providing the architect with a rugged vent which will neatly fit into the exterior wall module in standard and jumbo brick, and cinder or concrete block construction. Booklet illustrates such applications as air intake or exhaust for unit air conditioners as well as ventilation of roof spaces, crawl spaces, boiler rooms, hung ceilings, bathrooms or kitchen. Also discussed are two new fuel oil vents, furnished with standard pipe threading for 2" and 3" vent pipe connections, designed and approved for use as ventilators for fuel oil and volatile storage tanks. (4 pp.)

AIA FILE NO. 30-G-51 AND 30-J

MFR: CONSTRUCTION SPECIALTIES, INC.

Circle 359

WEATHERSTRIPPING AND SEALS

Woven wool pile weatherstripping and seals are described in recent bulletin which describes in detail materials used in pile, manufacturing process, and now weatherstripping seals. Included are illustrations of the four broad classifications into which the pile is formed. (4 pp.)

AIA FILE NO. 35-P-6

MFR: SCHLEGEL MANUFACTURING CO.

Circle 360

DOCUMENTS

The documents listed below are available through the associations and agencies cited. All requests should be directed accordingly.

Electrical Catalog Div., The Jaqua Co., *Grand Rapids, Mich.*

The Electrical Products Blue Book. *1961. 792 pp., illus. $24.95.*

This is reputed the largest reference book on electrical products. It contains information and illustrations covering the complete scope of electrical products, exclusive of appliances and electronics, manufactured in the U. S. today. Twenty-three different product classifications are represented with 71,370 individual product descriptions and listings, and 10,315 illustrations.

National Electrical Manufacturers Assn., *155 East 44th St., New York 17, N. Y. Minimum order: $1.00.*

Wiring Devices, *WD 2-1960. 35¢.*

This revised booklet covers the following: (1) dimension of the lamp shoulder gauge of medium-base lamps; (2) colors of molded compounds for wiring devices; and (3) dimensions of openings in wall plates.

Spool-type Secondary Racks, *PH 1-1960. 40¢*

This EEI-NEMA publication covers pole-mounted spool type secondary racks, with buttonhead spool pin, as commonly used in overhead line construction.

Dead-front Distribution Switchboards, *PB 2-1960. 25¢*

Describes the features of Class I, II and III dead-front distribution switchboards designed for equipment on 600 volt or less application and consisting of one or more vertical sections designed for floor mounting.

Hospital Staff Register Systems, *SB-6-1961. 35¢*

Covers hospital staff register systems of the direct reading type in which operation of the control device will provide a means of indicating at central locations the names of doctors and/or staff members present in the hospital. Four types of registers are described, and information is given concerning ratings, enclosures, mounting, internal wiring, markings, connections and use in hazardous locations.

Standards for Round Copper Magnet Wire: Single, Heavy and Triple Polyester Coated, *MW5;* **Ceramic Silicone Coated,** *MW 7;* **Ceramic Polytetrafluoroethylene Coated,** *MW 8;* **and Single, Double, Triple and Quadruple Polytetrafluoroethylene Coated,** *MW 10. 35¢ each.*

Each covers coating, packaging, joints, dimensions, tests and retests.

Vulcanized Fibre, *VU 1-1961. 60¢*

Describes the forms, colors, weights, dimensions, testing, and the physical, electrical and chemical properties of the following grades of vulcanized fibre: commercial, electrical insulation, bone, abrasive, bobbin, flexible, hermetic, pattern, railroad, shuttle, trunk and case, white and white tag.

Precision Snap-acting Switches, *IC 3-1961. 35¢*

American Standards Assn., *10 East 40th St., New York 16, N. Y.*

Standard Specifications for Lime-Cement Stucco, *A42.5-1960. 1960. 50¢*

This standard was sponsored and published jointly with The American Institute of Architects and American Society for Testing Materials. The specifications cover minimum requirements for lime-cement stucco and relate to exterior plastering of a structure. They include mixtures of lime, portland cement, and aggregates, suitable bases on which they may be applied, and their proper application under average climatic and jobsite conditions.

American Standard Specifications for Dry-Set Portland Cement Mortar, *A118.1-1959. $.50.*

This standard was sponsored by the Tile Council of America. It provides a combination of tests by which dry-set Portland cement mortar can be tested. The standard requires 250 psi shear strength of glazed ceramic wall tile to dry-set mortar after aging four weeks at room temperature. Its contents include sampling and testing procedures, test for dry-set mortar materials, linear shrinkage of mortars, shear strength of mortars to ceramic tile and staining tests.

Ottenheimer Publishers, Inc., *4805 Nelson Ave., Baltimore 15, Md.*

Interest and Mortgage Tables. *90¢*

This vest pocket, indexed guide is a handy reference to various computation problems on mortgage and interest payments.

NEW WINDOW FOR ARCHITECTS!

...from DeVAC

Thermo-Barrier insulates frame, solving problems of condensation*

*Patent pending

Combined Prime and Self-Storing Anodized Aluminum Window Joined in a Uniquely Designed Insulated Frame

THERMO-BARRIER*—High impact dry vinyl surrounds entire window and securely interlocks the frame of the prime unit with the frame of the combination storm unit, insulating against cold or heat transfer, providing added protection against condensation within the critical humidity range. Write for technical report on test results.

INSIDE—Condensation or buildup of frost is eliminated except under extreme conditions of humidity. Damage to drapes or to decorating is avoided and anodized aluminum gives permanent beauty.

OUTSIDE—Self-storing combination storm and screen unit adds convenience. T-6 temper gives extra strength to the anodized aluminum which allows trim design and neat appearance on light commercial buildings and all style homes.

TWO MORE DeVAC QUALITY PRODUCTS

Inside Replacement Windows—Manufactured to the exact size of each window to be replaced, these aluminum windows renew the appearance, install quickly and solve the problem of excessive maintenance or inoperation of existing windows.

Glasswalls—Floor-to-ceiling three-light window units with adjustable panels are ideal for walls, picture windows, breezeways, porches,

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5900 Wayzata Boulevard Minneapolis 16, Minn.

Circle 153 for further information

ACOUSTICS AND SOUND ABSORPTION

by David P. Costa

Mr. Costa, a mechanical engineer associated with the Raritan Arsenal, here discusses the nature of sound absorption and some desirable characteristics of sound absorbing materials.

Much progress has been made in understanding the transmission of sound through partitions. In the beginning it was thought that walls vibrated with the sound wave so that the heavier it was built, the smaller would be its amplitude, and hence the smaller the transmission. Therefore heavy walls were used for insulating rooms against outside sounds. These heavy walls certainly were good insulators, but their cost and weight were very great.

Materials which are good sound absorbers are comparatively *light* in weight and *porous*. Materials that are good for preventing the transmission of airborne sounds are *heavy* and *nonporous*. Thus it is evident that a good sound absorber is a poor sound insulator. No material is effective for both purposes, although, of course, a surface of a sound insulating material can be treated with sound absorbing material, thereby forming a structure which is effective for both purposes.

Noise problems are most effectively overcome in the design stage when planning new premises. A preliminary survey involves not only a study of the type of building to be set up, but also an investigation of the working processes and uses to which the building will be expected. The architect can then specify the amount and type of a given material that is to be placed in a room to bring its reverberation time* to a predetermined value.

Transmission of sound energy

When sound waves strike a wall, a portion of the energy is reflected into the room and we say that the rest is "absorbed." Sound energy is transformed into heat as the wave progresses through the material and if the material is thick enough, all the sound energy in the wave which entered the material will be entirely dissipated. If there are cracks or holes, part of the energy will travel through these as sound waves in air. Another part of the energy will set up true waves in the wall which will be transmitted through it as through any medium. But it must be emphasized that, because the wall is in general very much more dense than the air, the amount of sound energy conveyed through the wall in this way is negligibly small. Lastly, the incident sound waves on the wall will cause the wall to vibrate as a whole, i.e. as a diaphragm, and so absorb energy from the incident sound in the air on the other side. It is in this way that most of the sound energy is transmitted from the air of one room to that of the next. Of course it should be emphasized that the transmission about which we are here speaking is from air to air through the wall. The transmission of sound which originates in the wall or floor is naturally a different matter. In this case there may be considerable wave transmission through the partitions and the more rigid the construction the greater the transmission. Hence it arises that a room may be proof against sounds which arise in the air of the adjoining room (such as conversation or music), while it is not proof against sounds which arise by pounding on the floor or walls or the throbbing of machinery fixed rigidly to the floor. These facts must be considered in the practical application of sound proofing.

Absorption of sound

The usual acoustic materials average somewhat less than an inch in thickness. In this short distance even the more efficient absorbers usually cannot absorb all the sound energy transferred to the air in the pores. The unabsorbed portion is propagated through the back surface only to be reflected back into the material by the wall on which the material is mounted. After suffering further reduction in energy, what is left of the sound wave emerges from the front surface to combine with the initially reflected portion. It is evident that in the absence of any other absorption process, a porous material can absorb sound only if its interior is permeated by

(Continued on page 66)

DIGEST: 29

(Continued from page 65)

interconnecting pores and voids, and if the surface is open to permit direct access to the interior. This explains why some cellular materials like foamed glass do not absorb sound readily. The voids are completely isolated from one another by the walls of the cells so that air cannot pass from one void to another.

Air spacing

The method of mounting an acoustic material can greatly influence its sound absorbing power. Numerous measurements reveal that an increase in the air space in back of a material increases its sound absorbing power, particularly at the lower frequencies. The effect of an air space is to increase the effective thickness of the material. The presence of the air space behind the material moves the surface of zero normal velocity out back of the material, allowing a greater flow of air through the pores, and therefore allowing a greater absorption of energy. Architects and acoustic engineers often make use of this effect in prescribing acoustic treatment. At higher frequencies, other phenomena may enter the picture in such a way as to completely nullify the effects of spacing.

Filtering characteristics

The architect may be interested in sound absorption coefficients at individual frequencies or in the average coefficient over a range of frequencies. By custom, acoustic treatment for auditoriums and theaters is specified in terms of the sound absorption coefficient at 512 cycles per second. When the problem is one of reducing noise levels in a room, the architect uses the "noise reduction coefficient," which is the average of the sound absorption coefficients at 256, 512, 1024 and 2048 cycles per second. There is a trend toward specifications of acoustic materials for control of reverberation in terms of other frequencies in addition to 512 cycles per second.

If an architect chooses the thickness and acoustical constants correctly, he can obtain a great variety of transmission characteristics. For a single frequency, he can make a wall perfectly transmitting or perfectly opaque. By choosing the right combinations of layers of acoustical materials, he can obtain band pass and band elimination filters and various combinations of these.

An acoustical treatment depends on the type of noise source in the room under consideration. If the noise has an impulse character, as for instance in the case of sudden impact or hammering on metal, the use of deadening materials to damp out the high frequency reflections will bring about a noticeable improvement. If, however, the noise is fairly constant and continuous, as in the case of electrical machines, the improvement will not be of the same degree. The effectiveness of the sound proofing depends also on the height of the ceiling. A marked improvement can be obtained even with some of the noisiest conditions by erecting a sound absorbing ceiling at a lower level.

The absorbing material chosen should have its optimum absorption characteristics in the range of frequencies corresponding to the predominant amplitudes in the spectrum of the noise source. Most of the sound absorbing materials available have a considerably greater absorbing capacity in the region above 600 cycles per second, and are therefore effective in reducing high frequency components which are particularly objectionable to the ear, so that in many cases they are indispensable. In the low frequency range, absorbing materials are not effective to the same extent, and the best way of obtaining a reduction of the low frequency components is by damping or elimination at the source.

Prefabricated materials

Since the manufacturing process for prefabricated materials can be accurately controlled, the chief advantage in using these materials is the assurance that the material will have the sound absorption coefficients specified by the architect. This cannot be said in general for the materials intended for plastic application. The manipulation of the material on the job site often cannot be closely controlled. Slight departures from formula or unusual drying conditions may materially affect the plastic material's sound absorption.

Prefabricated materials are classified into different types on the basis of surface appearances. There is no choice between the different types as far as sound absorption is concerned, since there is a wide choice of coefficients available in each type. But there is a greater difference in the different types to withstand redecoration by means of paint. The perforated and the deeply fissured materials may take a number of coats of paint, either brush or spray, without marked detriment to their sound absorbing power. This is not the case with many materials whose surface is close textured. The painting of these must be done with extreme care if the acoustic life of the material is to be preserved.

It is noteworthy to remember that a greater absorption than that indicated by the absorption coefficients can be obtained if the available material is distributed in small patches than if it is lumped into one area. The effect is most pronounced when the small patches are well separated.

**Reverberation time (T) is determined by the relationship between the volume (V) of the space and the total absorption of all room surfaces and furnishings (a), according to the formula* $T = \frac{0.05V}{a}$*. If V is known and desired T has been set, substitution in the formula will give required "a". (Ed.)*

BOOKS

American Building Art: The twentieth century *by Carl W. Condit. New York: Oxford University Press, 1961. 427 pp., illus. $15.00.*

Professor Condit's new book is an exhaustive, thoroughly documented study of 20th century building in America. About one third is devoted to architecture proper; the remainder to bridges, roads and dams. The book is organized in the form of an illustrated running text with footnotes. This text follows the four-part criterion of economic need, structural problem, invention, and application. The footnotes are assembled by chapters in an ensuing section and bear out in much more detail points raised in the text; they do, in fact, comprise almost one-quarter of the book. There are a good many rarely seen structural detail drawings, and the many photographs perform a very useful job in supporting the text. Their quality, however, is uneven: some are excellent, some quite flat. The author has shown again that he has a refreshing command of English prose. Except for a dishearteningly confusing passage of a philosophical nature in a final chapter, the volume is very pleasing to read.

The book has, however, one flaw. While it is not really a critical study, it contains (particularly in the introduction and in the chapter entitled "An Architectural Appraisal") a series of value judgments and sweeping generalizations sharply out of tune with the measured tone of most of the book. For example: "The buildings that spring up everywhere, most numerously in New York, are not art at all because nothing in the purpose that shaped them can be given an artistic expression." Likewise: "The social character of the United States tends to be unconducive to original speculation and experiment. The spirit of innovation among its architects and engineers, with a few notable exceptions, has been curbed by corporate economic institutions which tend strongly to resist change." And: "The architect . . . must devote much of his talent to finding ways of containing equipment that yearly grows more elaborate and expensive. Thus his paramount concern must be *sacrificed* (italics reviewer's) to dealing with engineers and manufacturers."

It is not in its criticisms that the book has its strength, but rather in the scholarly, unhurried and comprehensive manner in which its author has explored and presented to us the

(Continued on page 68)

NAMES

CARL KOCH, FAIA. At MIT one day after lunch several years ago members of fourth year Architectural Design trooped into the departmental office to pick up their programs for the monthly sketch problem. What would it be this time? Late arrivals overheard what the others had already read for themselves. The program: a trailer. The author: Carl Koch, architect, teacher, planner and, very much *a propos*, sailor.

For a trailer and a ship—Koch sails a 46 foot yacht—have certain qualities in common: a precision of design, a careful working out of components, a direct relationship of parts to their functions, and a direct influence of parts upon the character of the whole. There is mutual understanding between the designer of the parts and the designer of the whole, who selects and assembles them: they may in fact be one and the same person. Finally, a trailer and a ship have this in common: they are built to be lived in.

All this characterizes precisely Carl Koch's thinking on architecture. It is this entirely friendly, even enthusiastic, attitude towards industry in architecture which has marked his whole career. After receiving his M.Arch. from Harvard in 1937, Koch traveled in Europe and Asia for a year, a trip which included a spell in the office of Sven Markelius, one of the earliest champions of modern architecture. After his return, he worked briefly for Gropius and Breuer and then formed his own office. When war broke out he became senior architect in the National Housing Agency. There, typically enough, his work consisted of research on community amenities, space standards, prefabrication methods and materials. In 1944 he was commissioned in the Navy, where he served until 1946.

Snake Hill, a nine home community in Belmont, Mass., was completed in 1940, and formed the first in a long line of small and medium sized architectural and large scale planning commissions. Among his better known buildings are the Fitchburg Youth Library, for which Gyorgy Kepes designed a very striking frieze; Eastgate apartments overlooking the Charles River (in association with colleagues from the MIT faculty); a synagogue for Temple Israel in Swampscott (in association with Pietro Belluschi); a library for the town of Wellesley; a bank in Saco, Maine; and the 100 house, 200 acre Conantum scheme, based on one acre lots and containing common land for recreation and farm use.

Koch's planning projects range from air base planning for the Strategic Air Command, to a market place for Masteram Pandya Bhavnagar, India, to a series of site planning plus home design developments involving as many as 300 houses. In addition he has been associated with various urban renewal projects in Cincinnati, Pittsburgh, New Haven and a new town in northern Canada.

But Koch's real significance in architecture today lies in a different direction, one at which we hinted when we spoke about ships and trailers. Between 1946 and 1949 he developed his first house based on the principle of assembly from prefabricated, carefully designed components. This was the Acorn House. At about the same time he worked for an improved model of the Lustron House, another preassembled structure, and in 1952 began his association with Techbuilt, for whom he designed a series of low-cost, semi-factory built one and two story houses. Houses built on this modular system are now on the market in 25 states, and adaptations are being developed for college housing, row apartments, motels, modular furniture, modular schools, and chapels. The basic system is subject to custom variations.

In the year 1959, Koch undertook a consulting project for the Armco Corporation in Middletown, Ohio. This project embarked upon a study of new products for building components and their applications in the housing industry.

This sort of activity is typical of Koch's viewpoint on industry's relation to architectural design. This viewpoint rejects blaming the industrial process for our highly chaotic environment. The blame, according to Koch, lies rather on those who still have not learned to control this industrial process to our best benefit. All will be well if "our components are designed with daring and imagination, if they are subjected intelligently to the discipline necessary to produce them efficiently, beautifully and economically, and if they are put together with the same daring and imagination."

No one can deny that Carl Koch is devoted to the role of practicing what he preaches.

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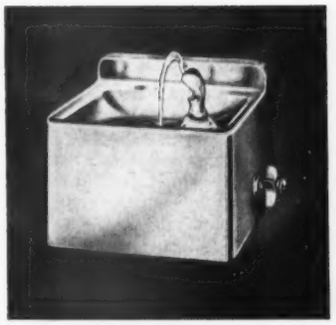

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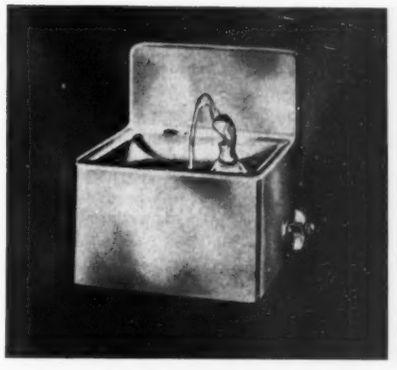

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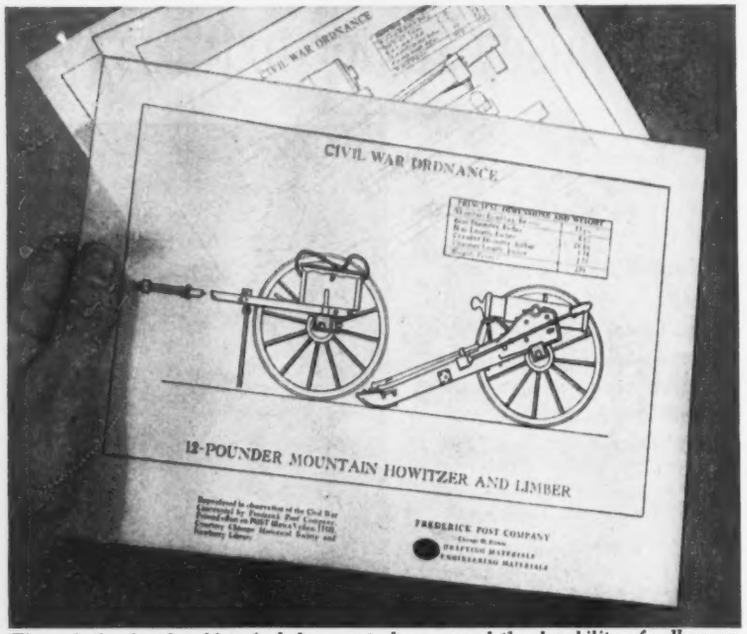

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BOOKS

(Continued from page 66)

vital output of American building art in our own century. It should go far to reassure anyone with doubts about this country's technological abilities. *SAK*

Elementary Statics of Shells, *Second Edition by Alf Pflüger. New York: F. W. Dodge Corp., 1961. 122 pp. $8.75.*

This covers the basic principles of the theory of shells of revolution, cylindrical shells, and shells of general shape—including a tabulation of the most important Membrane Theory solutions from which direct and practical design calculations can be made. This relatively elementary treatment of the subject is primarily a graphic study of the spatial interplay of forces in shells. Theory is elaborated only when necessary for the solution of more fundamental problems. Once the basic equations are set down, their results can be interpreted practically in tables and graphs.

Design of Prestressed Concrete Beams *by William H. Connolly. New York: F. W. Dodge Corp., 1960. 252 pp. $11.50.*

This comprehensive guide, through the use of design tables, approaches the problem of selecting the cross-section in a logical, direct manner. Emphasis is placed on the reduction of the tedious trial and error normally involved in design problems. It contains numerous tables, illustrations, diagrams and worked examples.

The Corrosion and Oxidation of Metals: Scientific Principles and Practical Applications *by Ulick R. Evans. New York: St. Martin's Press, Inc., 1960. 1,094 pp., illus. $25.00.*

Presents the author's views on corrosion with a summary of the experimental work which influenced these views. Sources documented directly in the text. Treatment and scope are cyclopedic. Each chapter has an introductory synopsis and a concluding annotated selection of additional references, making the work in effect a series of related monographs to be read and referred to singly or collectively. The author has been engaged in corrosion research at Cambridge University for many years.

Cathodic Protection; Its Theory and Practice in the Prevention of Corrosion *by John H. Morgan. New York: The MacMillan Co., 1960. 325 pp., illus. $12.00.*

An introduction to the theory and practice of cathodic (electrical) protection against metallic corrosion. Requires electrical engineering background. Thorough treatment with a wealth of detail devoted to description of particular conditions and recommended techniques. Generous use of graphs, diagrams, and drawings and photographs.

films

Science for Science *available through Laboratory Equipment Section, Scientific Apparatus Makers Assn., 20 N. Wacker Drive, Chicago 6, Ill. 35 mm., sound and color, 15 minutes running time.*

This film was prepared especially for science educators, school administrators, boards of education and planners of school scientific laboratory facilities. Basically, the film stresses the vast amount of quality control, research and development carried on constantly in the scientific furniture industry's manufacturing. From the initial steps in science room planning, the viewer is shown the industry's engineering, design and drafting department resources. Many actual production operations in the building of laboratory furniture are also described and shown.

Blueprint for Better Schools *produced by National Lumber Manufacturers Assn. and available through Sterling Movies U.S.A., Inc., Central Booking Office, 100 West Monroe St., Chicago 3, Ill., attention, Gordon Hempel. 16 mm., sound and color, 22 minutes running time.*

This film points out the specific advantages of using wood in school construction and presents many examples of how these advantages have been utilized in school buildings throughout the country.

Comparative Fire Test on Wood and Steel Joists *available through National Lumber Manufacturers Assn., 1319 18th St., N. W., Washington 6, D. C., attention, William E. Penoyar. 16 mm, sound and color, 22 minutes running time.*

This film illustrates how wood framing long outlast exposed metal framing when the two are subjected to a fire. The movie is based on a study made at the Southwest Research Institute, San Antonio, Tex.

EDITORIAL

THE NOISE THAT CAME TO DINNER. That is how Serge Chermayeff, who coins a mean phrase, recently described the impact of the twentieth century on the human eardrum. Like Moss Hart's guest, sound originally came into our house a welcome visitor, but has stayed to the point where we sometimes wonder if we were wise to invite him. Our eyes have it all over our ears in this respect. Eyes can be averted, light switches flipped, blinds lowered. Not so our ears. The decibels seep through windows and under doors, they hammer their way through the ceiling and rise above the floor and crash through the partitions, to the degree where we feel like nothing so much as inmates of a huge acoustical gold-fish bowl.

All this came about very gradually, of course. Our original guest came in the form of a middling sized wooden box, containing an induction coil, a variable condenser, a tube or two and a loudspeaker; his name was Radio. He was shortly joined by a companion, Phonograph, and in due course another, Television. These gentlemen brought with them by the dozen various cousins and aunts: Dishwasher, Typewriter, Flush valve, Telephone, Vacuum cleaner. And they left out in the open air Internal Combustion Motor and his young friend, Jet Engine.

Needless to say these things are all in themselves extremely useful or pleasurable, as the case may be. We personally like our radio and our telephone as much as the next man. But what started as a blessing has been turned into a severe problem by the nature of our civilization and of our architectural concepts. Item: the elevator has enabled us to live in hitherto undreamed of concentrations, office above office, apartment above apartment, classroom above classroom. Item: economic and aesthetic considerations place a larger and larger premium on flexibility and open planning, so that we have let down our binaural defenses through less and less substantial or even nonexistent space-dividers; this has exacted more noise makers, for example kitchen fans to keep the smell of kippers out of the living area. Item: central distribution of heat, cooling, and clean air has made of our buildings one large sound distribution system. Item: increasing car ownership and rising air travel combined with greater and greater window areas have, literally, brought the outside in, pleasant daylight together with tiresome noise.

If we are not each to build our own little room in the midst of the fast vanishing prairie, hermitlike, we shall have to do something else in order to enjoy the goodies of our civilization and still not have the noise part us from our sanity. Fortunately Mother Technology is very kind in this respect: for whenever she grants us what turns out later to be a mixed blessing, she also reveals to us the means to make this blessing pure again.

The noise which came to dinner is no exception. The principles governing the nature of sound are becoming increasingly clear. Our age of specialization has created the expert in acoustics. Very soon, by dint of theory and experiment, the characteristics of sound will be exactly known to us. No longer need we commit the gross blunder of thinking that if our neighbor likes his Brahms at three in the morning, stuffing an extra overcoat and a pair of sports jackets into the closet between will bring about peace. Entirely different acoustical concepts are involved: one is transmission, the other absorption. Henceforth, designing of a satisfactory acoustical environment will come about with as much certainty of good results as installing a heating system which heats or a drainage system which drains. More and more building products appear upon the market after being tested not only for structural strength, heat conductivity, corrosion resistance and such, but also for acoustic absorption and transmission loss, and at all standard frequencies too, for this is a factor. The basic principles and techniques of good acoustic design are available to us. As the tempo of our civilization accelerates ever faster, it will become vitally important to be able to work and relax in peace. To this end architects and engineers must keep the walls of Jericho in good repair. *SAK*

We welcome to the A/E NEWS technical advisory panel Professor A.G.H. Dietz of MIT. Professor Dietz's broad familiarity with the nature of materials of construction will be invaluable in presenting developments in this field with timeliness and accuracy.

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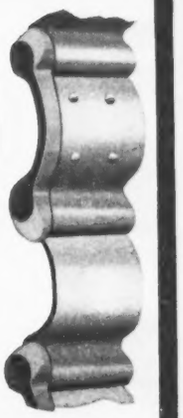

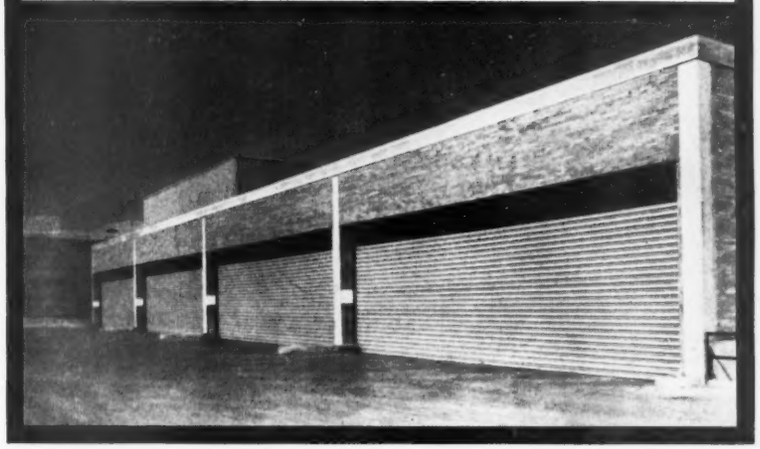

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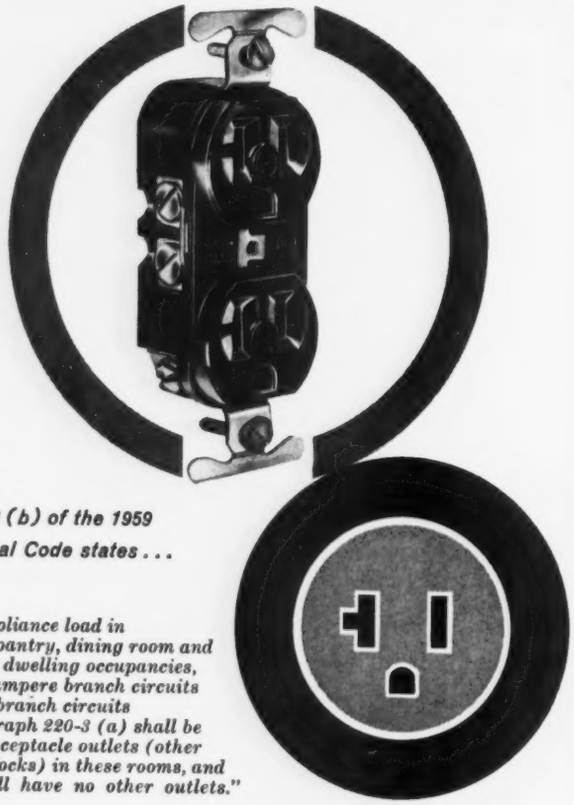

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16-18 BUILDING RESEARCH INSTITUTE: spring conferences, Shoreham Hotel, Washington, D. C.

17-21 ROYAL ARCHITECTURAL INSTITUTE OF CANADA: 54th annual assembly, Chateau Frontenac Hotel, Quebec City, Canada.

22-24 CONSTRUCTION SPECIFICATION INSTITUTE: 5th annual convention, Commodore Hotel, New York City.

22-25 DESIGN ENGINEERING SHOW: exposition and conference, Cobo Hall, Detroit, Mich.

23 NEW YORK PUBLIC LIBRARY 50TH ANNIVERSARY: celebration of opening of central building at Fifth Ave. and 42nd St. A three-day program will honor the anniversary.

JUNE 5 STANDARDS ENGINEERS SOCIETY: one-day engineering standards seminar and selected exhibit, sponsored by N. Y. section. Carnegie International Building, New York City.

8-9 NATIONAL ELECTRICAL MANUFACTURERS ASSN.: western conference, The Biltmore Hotel, Los Angeles, Calif.

21-27 BUILDING RESEARCH INSTITUTE: summer program planning session. Wianno, Mass.

25-30 AMERICAN SOCIETY OF TESTING MATERIALS: national meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

26-28 AMERICAN SOCIETY OF REFRIGERATING ENGINEERS: annual meeting, Denver, Colo.

JULY 3-7 SIXTH CONGRESS OF THE INTERNATIONAL UNION OF ARCHITECTS: London (for full information write Secretary, Royal Institute of British Architects, 66 Portland Place, London W. 1, England).

20-21 EXPANDED CLAY & SHALE ASSN.: mid-year meeting. Americus Hotel, Allentown, Pa.

SEPT. 3 INTRODUCTION TO EUROPEAN ARCHITECTURE TOUR: 30-day tour under the direction of Joseph Watterson, Editor of the "AIA Journal." For further information contact: Travel Abroad, Inc., Rm. 527, 550 Fifth Ave., New York 36, N. Y.

OCT. 6 SEVENTH ARCHITECTS' TOUR JAPAN: 24-day tour. For further information contact: Kenneth M. Nishimoto, AIA, 263 South Los Robles Ave., Pasadena, Calif.

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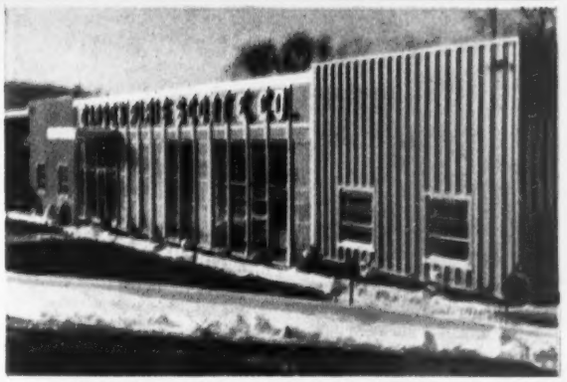

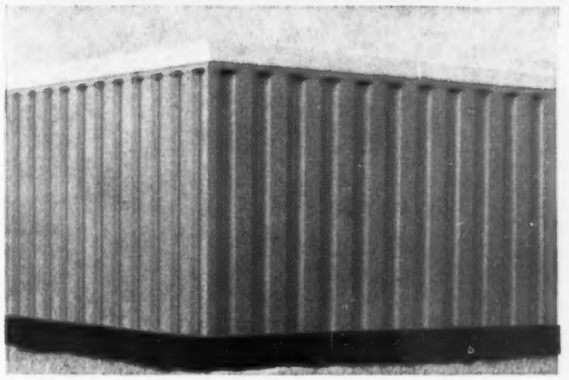

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16-18 BUILDING RESEARCH INSTITUTE: spring conferences, Shoreham Hotel, Washington, D. C.

17-21 ROYAL ARCHITECTURAL INSTITUTE OF CANADA: 54th annual assembly, Chateau Frontenac Hotel, Quebec City, Canada.

22-24 CONSTRUCTION SPECIFICATION INSTITUTE: 5th annual convention, Commodore Hotel, New York City.

22-25 DESIGN ENGINEERING SHOW: exposition and conference, Cobo Hall, Detroit, Mich.

23 NEW YORK PUBLIC LIBRARY 50TH ANNIVERSARY: celebration of opening of central building at Fifth Ave. and 42nd St. A three-day program will honor the anniversary.

JUNE 5 STANDARDS ENGINEERS SOCIETY: one-day engineering standards seminar and selected exhibit, sponsored by N. Y. section. Carnegie International Building, New York City.

8-9 NATIONAL ELECTRICAL MANUFACTURERS ASSN.: western conference, The Biltmore Hotel, Los Angeles, Calif.

21-27 BUILDING RESEARCH INSTITUTE: summer program planning session. Wianno, Mass.

25-30 AMERICAN SOCIETY OF TESTING MATERIALS: national meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

26-28 AMERICAN SOCIETY OF REFRIGERATING ENGINEERS: annual meeting, Denver, Colo.

JULY 3-7 SIXTH CONGRESS OF THE INTERNATIONAL UNION OF ARCHITECTS: London (for full information write Secretary, Royal Institute of British Architects, 66 Portland Place, London W. 1, England).

20-21 EXPANDED CLAY & SHALE ASSN.: mid-year meeting. Americus Hotel, Allentown, Pa.

SEPT. 3 INTRODUCTION TO EUROPEAN ARCHITECTURE TOUR: 30-day tour under the direction of Joseph Watterson, Editor of the "AIA Journal." For further information contact: Travel Abroad, Inc., Rm. 527, 550 Fifth Ave., New York 36, N. Y.

OCT. 6 SEVENTH ARCHITECTS' TOUR JAPAN: 24-day tour. For further information contact: Kenneth M. Nishimoto, AIA, 263 South Los Robles Ave., Pasadena, Calif.

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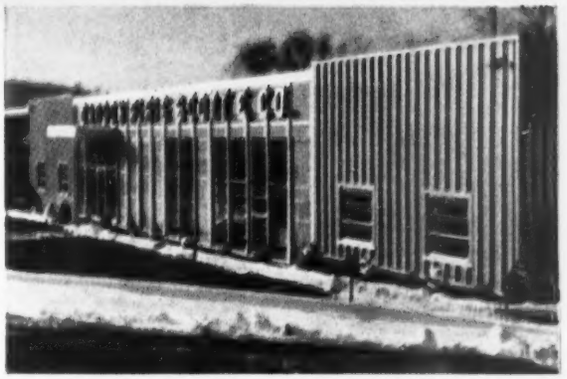

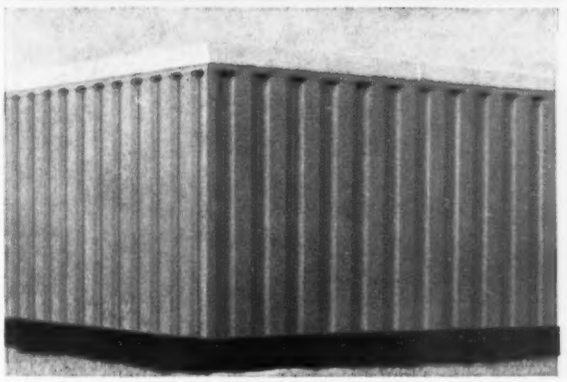

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